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# 20 Authors Share Major Awards at Army Science Conference

PRINCIPAL PARTICIPANTS at Army Science Conference included (l. to r.) Brig Gen Walter E. Lotz, Director of Army Research; Dr. Donald F. Hornig, Special Assistant to the President for Science and Technology; Willis M. Hawkins, Assistant Secretary of the Army (R&D); General Frank S. Besson, Jr. commanding general of the U.S. Army Materiel Command; Dr. William Petrie, Deputy Chief Scientist of the Canadian Defense Research Board.

Ninety-six technical papers presented at the 1964 Army Science Conference, June 17–19 at the U.S. Military Academy, West Point, N.Y., established a new peak for overall professional quality and nine won $3,800 in awards. Eleven additional papers earned Certificates of Outstanding Achievement.

More than 450 participants joined with a panel of judges consisting of top Army scientists in acclaiming the high standard of the presentations.

Three additional papers presented by invited speakers did not compete for the awards. Brig Gen J. Wilson Johnston, CG of the U.S. Army Satellite Communications Agency, spoke on Army Participation in Project SATCOM. Highlighting his presentation was a dramatic demonstration in which he picked up a telephone at his side, called for the commander of the *U.S.N.S. Kingsport* at sea off the coast of Honolulu to "come in," and carried on, only a second later, a conversation with him heard by members of the audience.

The other invited papers were by Billy M. Horton, technical director of

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# Army Honors 23 for R&D Achievements

Capabilities of Army in-house laboratories personnel to perform a broad diversity of complex scientific investigations are demonstrated by 15 winners of 1964 Army Research and Development Achievements Awards.

Twenty-three individuals will share in the presentation of the awards, three of which recognized team effort, as announced late in June. Chief of Research and Development Lt Gen William W. Dick, Jr., will make the awards to winners in the metropolitan Washington, D.C., area and major commanders later will present the other awards in his name.

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## Featured In This Issue . . .



# Stanwix-Hay Takes Key DoD Technical Data Post

News-making success in handling an experiment in management during recent months has gained the Army's Brig Gen Stanwix-Hay another challenging assignment, announced June 15 by Secretary of Defense Robert S. McNamara.

Brig Gen Stanwix-Hay

Tentatively scheduled July 27, the general will vacate his job as director of the Defense Contract Administration pilot office in Philadelphia to become director of a new Office of Technical Data and Standardization Policy in Washington, D.C.

Secretary McNamara's announcement did not delineate in precise detail the scope of the general's new task. Presumably, that clarification will evolve from a series of forthcoming conferences with other top-ranking leaders in the DoD scientific and technical information program.

Still to be determined, as indicated by response to inquiries to the Office of Defense Director of Technical Information, headed by Walter M.

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Army R&D Newsmagazine

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# No. 1 Federal Science Leader Acclaims In-House Labs

*When Dr. Donald F. Hornig made the principal address at the 1964 Army Science Conference banquet June 18, he became the first No. 1 Federal Science leader to speak at the biennial gathering (fourth in the series) of more than 450 of the Army's key research and development personnel.*

*Excerpted here is the major portion of the address of the man who holds four titles—Special Assistant to the President for Science and Technology, Director of the Office of Science and Technology, Chairman of the Federal Council for Science and Technology, and Chairman of the President's Science Advisory Committee.*

*Dr. Hornig opened with comments about his experience as a scientist at the Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md., during the early phase of World War II, told the customary banquet joke to warm up his audience, and then launched into a discussion of many matters of top interest to the Army R&D community, including some of the principal functions of his position, as follows:*

★ ★ ★

. . . I would like to say a little bit now about science and the Government and why there should be a science adviser in the White House. According to *Science Magazine*, my predecessor was the "Czar of American science," and by that account I have inherited more powers, direct and indirect, than any man in scientific history. This, let me say, is nonsense. . . . It seems that there may be some misunderstanding of what really has happened. Science in modern times has become a very large-scale activity of the Federal Government of the United States, not only in the three Services, but in the Atomic Energy Commission, the National Aeronautics and Space Administration, the Department of Agriculture, and the National Institutes of Health.

As has been well advertised in the last year, the Federal Government spent some $15 billion on research and development. That is about one-seventh of the total Federal budget. In fact, research and development is about one-third of the disposable Federal budget in any given year; by disposable, I mean that part of the total annual national budget which remains after one has subtracted all the payments on the debts, veterans' payments, and basic expenses in the form of fixed continuing obligations.

Expenditures of this magnitude obviously become a matter of serious concern to the President. If a Nation is spending as much as $15 billion, or 2½ percent of the gross national product, it is not surprising that in recent times it has aroused the interest of not only the Chief Executive, but the Congress and the public as well.

This research and development activity affects major industries in this country and hundreds of thousands of highly skilled jobs. It affects our entire higher educational structure. Therefore, it rightly has become a matter for serious public discussion. In the last few years, I think that the public and the Congress have become aware of the important role played by scientific research and technological development—in maintaining the security of the Nation, stimulating the growth of our economy, improving the health and welfare of our people. The nature and scope of this enterprise is being studied intensively by two Committees of the Congress, and is the recurrent theme of many articles in popular magazines.

One consequence is that the scientific and technical community no longer finds itself isolated from the rest of society. We have reached a situation where the public expects to understand what is being undertaken. The scientific and technical community finds itself with a necessity and obligation to explain itself, justify what it does, to make clear what this enterprise is about. It must justify the methods it uses in choosing its objectives. It must define its objectives in terms that the nonscientific public can understand. This, I think, is a welcome—but demanding—turn of events.

These pressures make themselves felt in the White House and determine the role of my Office. Many problems transcend the responsibilities of any single agency or department of the Government. I'll mention just a few specific ones that are of serious public concern.

The problem of the water resources of this country is becoming a general problem of not only the Southwest but even areas like Long Island and the Delaware Valley. In fact, all of the major industrial areas of the country have either present or prospective difficulties with their water supplies. Water re-

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# President Selects Young Generals for Top Army Staff Assignments

President Johnson selected Lt Gen Harold K. Johnson on June 25 to succeed General Earle G. Wheeler as U.S. Army Chief of Staff and Lt Gen Creighton W. Abrams, Jr., as Vice Chief of Staff. Both appointees were nominated for rank of general.

General Wheeler is the new Chairman of the Joint Chiefs of Staff, succeeding General Maxwell D. Taylor, who has been assigned to South Viet Nam as ambassador.

The President passed over 10 full generals in making the appointments. General Johnson, 52 years old, ranked 32nd on the general officer list. General Abrams, who will be 50 in September, ranked 34th as a nominee to succeed General Barksdale Hamlett, who has retired for reasons of health.

Lt Gen H. K. Johnson

Lt Gen C. W. Abrams, Jr.

GENERAL JOHNSON, a native of Bowesmont, N. Dak., and no relation to the President, was serving as Deputy Chief of Staff for Military Operations. He became a lieutenant general in July 1963. Graduated from the U.S. Military Academy in 1933, he served in the Philippines early in World War II and was captured at Bataan in 1942 by the Japanese, remaining a prisoner for the duration of the war.

Returning to the United States, he attended the Command and General Staff College, Fort Leavenworth, Kans., and the Armed Forces Staff College at Norfolk, Va. During the Korean War, he commanded the Fifth and Eighth Cavalry Regiments of the First Cavalry Division.

Upon his return to the United States, he was assigned to the Office of the Chief, Army Field Forces, at Fort Monroe, Va., and later attended the National War College, graduating in 1953.

Assigned to the Office of the Assistant Chief of Staff, G3, Operations, he served as chief, Joint Plans Branch, assistant to the chief of the Plans Division, G3, and as executive officer, G3, until moved to Fort Carson, Colo., in January 1956 to serve as assistant commander, Eighth Infantry Division.

General Johnson spent 20 months in Germany with the Eighth Infantry Division, then became chief of staff, Seventh Army Headquarters in Stuttgart-Vaihigen. In April 1959, he was moved to Headquarters, U.S. Army, Europe as assistant chief of staff, G3.

General Johnson has been awarded the Combat Infantryman's Badge with Star, the Distinguished Service Cross, the Legion of Merit with three Oak Leaf Clusters and the Bronze Star Medal.

GENERAL ABRAMS was serving as commanding general of the Fifth Corps in Germany at the time of his appointment as Vice Chief of Staff. He was promoted to lieutenant general last August. From 1960–63 he was commander of the Third Armored Division in Europe.

A native of Springfield, Mass., and a 1936 graduate of the U.S. Military Academy, he served in Europe during World War II in the 4th Armored Division. Following VE Day, he was assigned to the War Department General Staff. From 1946–48 he was director of tactics at the U.S. Army Armored School, then was graduated from the Command and General Staff College. Several battalion command assignments in Germany and the Far East preceded his graduation from the National War College. He then served successively as Chief of Staff for I Corps, X Corps and IX Corps in Korea. In 1955 he was Chief of Staff of the Armored Center, Fort Knox, Ky.

Promoted to brigadier general in 1956, he was assigned to the Department of the Army General Staff as the Deputy Assistant Chief of Staff for Reserve Components. In 1959 he returned to Europe as Assistant Division Commander of the Third Armored Division and the following year, as a major general, he served as Deputy Chief of Staff, Operations, Hq., U.S. Army, Europe.

In July 1962, he was appointed Director of Operations in the Office of the Deputy Chief of Staff for Military Operations and in October 1962 assumed the duties of the Assistant Deputy Chief of Staff for Military Operations for Requirements and Programs. He was appointed Deputy Assistant Chief of Staff for Force Development in April 1963 and commanding general of V Corps on July 15, 1963.

General Abrams' decorations include the Distinguished Service Cross with Oak Leaf Cluster, Silver Star Medal with Oak Leaf Cluster, Legion of Merit with Oak Leaf Cluster, Bronze Star with Valor Device and the French Legion of Honor.

## General Dick Slated to Speak At Reserves Nuclear Seminar

Lt Gen William W. Dick, Jr., Chief of Research and Development, will address the Aug. 9-22 Seminar in Nuclear Sciences sponsored by the 3252nd U.S. Army Reserve R&D Unit at Oak Ridge, Tenn.

The seminar will be held in the U.S. Army Reserve Training Center at Oak Ridge and General Dick will speak on Aug. 20. Its purpose is to provide Reserve officers having scientific or technical background with up-to-date information in the field of nuclear science, with particular reference to nuclear power reactors and technology and other military applications. Radiation and radiation effects will be emphasized.

The U.S. Navy and U.S. Air Force each will send five representatives to join those from various Army elements. This is the fourth Seminar in Nuclear Sciences conducted by the Oak Ridge unit. Others were in 1960, 1962, and 1963. As in previous years, participants will tour the Atomic Energy Commission's Oak Ridge National Laboratory.


**ARMY SATELLITE COMMUNICATIONS (SATCOM) Agency display at entrance to the South Auditorium and battery of phones that broadcast explanation of SATCOM operations was one of the highlights as well as the most popular meeting place for conferees at the 1964 Army Science Conference held at the United States Military Academy.**

# Authors Share Awards at Army Science Conference

(*Continued from page 1*)

the Harry Diamond Laboratories in Washington, D.C., on Control, Amplification and Fluids, and by Lt Col Timothy G. Barila, chief of the Department of Resuscitation and assistant commandant at Walter Reed Army Institute of Research, on Medical Trends in Life Support Systems.

Top honors among the 20 individuals who shared in the major awards went to Col Robert M. Hardaway, Walter Reed Army Institute of Research in Washington, D.C., and a team of Dr. Gerhard K. Gaule, James T. Breslin, Raymond L. Ross and 2nd Lt Roy S. Logan, representing the Army Electronics Laboratories, Fort Monmouth, N.J. Each award carried a $750 honorarium.

Team effort, reflective of an increasing trend in Army in-house laboratories, also collected two of the next three high awards of $500 each. John J. Egli, who entered the employment of the Army Electronics Laboratories in February 1941, was recognized for a classified presentation titled Electronic Counter-Countermeasures Design Techniques for Communications.

One of the $500 team awards was shared by a military-civilian trio from the Walter Reed Army Institute of Research, consisting of Capt. H. Thomas Norris, Richard A. Finkelstein and Col Helmuth Sprinz. Their paper was titled a Morphologic Study of the Pathogenesis of Experimental Cholera in the Infant Rabbit.

The Chemical Research and Development Laboratories at Edgewood Arsenal, Md., whose scientists consistently have been among award winners at the Army Science Conference, produced the other team winner of $500. Charles E. Williamson, Jacob I Miller, Samuel Sass and Benjamin B. Witten coauthored Design Reaction Mechanism of Short-Lived Alkylating Agents.

Warren W. Berning, long recognized among top scientists of the Army Ballistics Research Laboratories, Aberdeen Proving Ground, Md., and H. C. Allen, regarded as one of the gifted young scientists of the Army Missile Command, Redstone Arsenal, Ala., won awards of $200 each. Another $200 award was presented to Edward A. Gerber and Edwin R Ahlstrom of the Army Electronics Laboratories.

Berning's paper was titled High Altitude Ionization Associated with Nuclear Detonations. Allen's was Cryztallization in Solid Propellant Binders and Its Effect on Low-Temperature Missile Capability. Gerber and Ahlstrom coauthored Ruby Laser with Vibrating Reflector.

Each of the authors who received a cash honorarium also was presented with a Certificate of Outstanding Achievement signed by Assistant Secretary of the Army (R&D) Willis M. Hawkins and Lt Gen William W. Dick, Jr., Chief of Research and Development. Certificates were presented also to 24 authors and coauthors of 11 outstanding papers which did not earn monetary honorariums.

**ARMY CHIEF of R&D Lt Gen William W. Dick, Jr., welcomes Army Science Conference participants.**

**(L. to R.) Dr. J. V. R. Kaufman, chief scientist, Munitions Command, and member of the Army Research Council; Dr. Joseph Kaufman, special assistant to the chief, Chemistry and Materials Branch, Army Materiel Command (AMC); Robert R. Phillipe, chief, Environmental Sciences Branch, AMC; Billy M. Horton, technical director, and Lt Col M. S. Hochmuth, commander, Harry Diamond Laboratories; Col Robert N. Grove, comptroller, U.S. Army Natick Laboratories.**

The Army Incentive Awards Program, represented at the Conference by the executive secretary of the selection board, Jerry Mason, provided funds for the honorariums to civilian authors. As in previous years, the Association of the United States Army, represented this year by Stanley S. Hiller, Jr., president of Hiller Aircraft Corp., contributed funds for awards to military authors of prize papers.

Deputy Assistant Secretary of the Army (R&D) Charles L. Poor presented cash awards to civilian winners and Mr. Hiller made the awards to military authors. Director of Army Research Brig Gen Walter E. Lotz, Jr., presented Certificates of Outstanding Achievement to other authors in the honorable mention category, as follows:

• Dendritic Morphology of High-Strength Steel Casings, by Paul J. Ahearn and Francis C. Quigley, U.S. Army Materials Research Agency, Watertown (Mass.) Arsenal. Interpretation of Aerial Imagery of Sea Ice, by Vernon H. Anderson, Cold Regions Research and Engineering Laboratories, Hanover, N.H.

• Numerical Solution of the Distribution of Wind and Turbulence in the Planetary Boundary Layer, by James F. Appleby and William D. Ohmstede, Army Research and Development Activity, Fort Huachuca, Ariz. Functional Dependence of the Radar Cross Section of the Wake of a Re-entry Vehicle on CDA, by Ralph L. Edwards, Physical Science Laboratories, Redstone Arsenal, Ala.

• Re-entry Vehicle for Radar Sensitivity Evaluations, by Robert M. Colton and Edward B. Dobbins, Army Materials Research Agency, Watertown, Mass. Molecular Mechanisms for Antimicrobial Action, by Fred E. Hahn, Walter Reed Army Institute of Research, Washington, D.C.

• Monocycle Position Modulation, by William A. Huber, Army Electronics Laboratories, Fort Monmouth, N.J. Radiation Biodosimetry and Screening for Radioprotective Compounds, by Hillel S. Levinson and Esther B. Garber, U.S. Army Natick (Mass.) Laboratories. The Mechanism of Preferential Ablation, by Bernard Steverding, Redstone Arsenal, Ala.


**Three women scientists were involved in technical papers given at the 1964 Army Science Conference, but the only one who made a presentation was Dr. Dora K. Hayes of Dugway Proving Ground, Utah. Though the paper, prepared jointly with Dr. V. J. Cabelli, now assistant director for research, U.S. Public Health Service in Rhode Island, not did win any special honors, Dr. Hayes commanded considerable attention as an example of "beauty with brains." Here she poses with (l. to r.) Dr. Harold C. Weber; Stanley Hiller, Jr., president, Hiller Aircraft Corp., who presented awards on behalf of the Association of the U.S. Army; Brig Gen William W. Bessell, Jr., Dean of the Academic Board, U.S. Military Academy; and Deputy Assistant Secretary of the Army (R&D) Charles Poor. Since obtaining a Ph. D. degree at the University of Minnesota in 1961, Dr. Hayes has been employed at Dugway, where her husband, Dr. John C. Hayes, is chief, Division of Technical Information. She is a research biologist.**

**(L. to R.) Dr. Leonard S. Wilson, chief, Environmental Sciences Division, U.S. Army Research Office (USARO); Dr. I. R. Hershner, scientific director of Army Research and general chairman of the conference; Dr. Harold C. Weber, chief scientific adviser, U.S. Army, and conference presiding chairman; Lt Gen Dwight E. Beach, CG, U.S. Army Combat Developments Command; Dr. Meredith Crawford, director, Human Resources Research Office, George Washington University; Col Nils M. Bengtson, commander, USARO-Durham (N.C.); Dr. William Van Royen, vice chairman, Army Scientific Advisory Panel and head, Department of Geography, University of Maryland, internationally famed for his work.**

• The Purification and Characterization of Staphylococcal Entertoxin B, by Edward J. Schantz, William G. Roessler, Jack Wagman, Leonard Spero, David Stefanye, David A. Dunnery and Merlin S. Bergdoll, U.S. Army Biological Laboratories, Fort Detrick, Md. Phosphorus, Arsenic and Boron-Containing Ferrocene Derivatives, by Gilbert P. Sollott, Jonathan L. Snead, Seymour Portnoy, William R. Peterson, Jr:, and Helen E. Mertwoy, Frankford Arsenal, Philadelphia, Pa.

COL HARDAWAY's $750 award winning paper was titled Influence of Trauma and Hemolysis on Hemorrhagic Shock in Dogs. Applauded vigorously by the audience for effective presentation as well as for its content (judges select award-winning papers strictly on the basis of content), the paper pointed out that a degree of hemolysis normally harmless to dogs may prove fatal in much smaller amounts when combined with otherwise nonfatal hemorrhagic shock, due to the clotting factor in the red blood cell.

DR. GAULE's $750 presentation, titled Superconductors in Advanced Electronics, described a novel method for the remote control of current in a superconducting circuit, based on a relay switch in which two small but very effective superconducting magnetic coils actuate a pair of superconducting contacts. Used to "charge" and "discharge" a superconducting

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**ARMY SCIENCE CONFERENCE** participants shown on this page include: Fig. 1, Brig Gen J. Wilson Johnston. Fig. 2 (left to right) Dr. Richard Weiss, U.S. Army Research Office; Col William G. Willmann, CRDL commander; John J. Egli, AEL; Maj Gen Frank W. Moorman, CG, Army Electronics Command (AEL); Harry W. Parmer, AEL; and Col Kimbrough, AEL commander. Fig. 3, Dr. H. K. Ziegler, AEL. Fig. 4, Dr. Walter Cawood, British War Office chief scientist. Fig. 5, Dr. Ralph Siu, chairman of the Army Research Council and toastmaster at the banquet, flanked by Mrs. Cora Watson (left) and Mrs. Janice Sexton, Army Research Office secretaries who served as "hard working" (Dr. Siu's tribute) conference receptionists. Fig. 6, M. B. Sulzberger, Office of The Surgeon General. Fig. 7, Maj Gen J. F. Thorlin, CG, White Sands Missile Range, and Brig Gen R. E. Blount, CG, Medical R&D Command. Fig. 8, Dr. Craig M. Crenshaw, chief scientist, U.S. Army Materiel Command, and Dr. Harold C. Weber, U.S. Army Chief Scientific Adviser and presiding chairman of the conference.

*DIRECTOR OF ARMY RESEARCH Brig Gen Walter E. Lotz, Jr., presented Certificates of Outstanding Achievement to 24 authors and coauthors of 11 technical papers at 1964 Army Science Conference. Here, Dr. Bernard Steverding, U.S. Army Missile Command, receives an award for a presentation on work that earned him an invitation to present a paper, titled Fatigue of Metals under Space Conditions, at the First International Congress on Space and Vacuum Research in Paris, France, June 29-July 4. He will make two technical reports on July 13 in London at the Tri-Partite Conference.*

(*Continued from page 5*)

solenoid, the method provides a new principle of storing electrical energy which is analogous to, but in certain ways superior, to that of a capacitor.

CHARLES E. WILLIAMSON's $500 award presentation reported on studies at the Army Chemical R&D Laboratories that are helping to employ alkylating agents as useful tools in the study of basic life mechanisms. The agents, he said, are capable of producing radiation-type symptoms, chromosomal aberrations, mutations, and carcinogenic as well as cancer chemotherapeutic effects, although their basic mechanisms of chemical reaction are still only vaguely understood. As a result of the Army studies at CRDL, alkylating agents for many biological applications can now be designed much more accurately on a theoretical basis.

CAPT T. H. NORRIS, in his $500 presentation on A Morphologic Study of the Pathogenesis of Experimental Cholera in the Infant Rabbit, discussed how research at Walter Reed Army Institute of Research has indicated that the signs and symptoms of cholera can be experimentally produced in the absence of viable cholera vibrios by products that can be extracted from the vibrio cytoplasm or are elaborated by vibrios during growth. The technique is important in respect to the spread of cholera in Southeast Asia which has increased the need of the Army for basic research to combat it.

Authors whose papers did not win Certificates of Outstanding Achievement may glean a measure of consolation from knowing that a paper acclaimed by a noted medical leader as a "magnificent new approach to immunologic concepts" did not qualify for an award.

That was the recognition accorded by Dr. M. B. Sulzberger, one of the four session chairmen, to a paper titled Graft Rejection in the Fetal Lamb, presented by Air Force Capt K. L. Kraner, who worked on the project with the author, A. M. Silverstein, at the Armed Forces Institute of Pathology. Their research is the subject of a page 12 feature article.

Similarly, a paper that won resounding applause but did not merit a certificate was presented by Private First Class Edward J. Zehler of the Army Electronics Laboratories. Certainly, in the opinion of the editor of this publication, who was in the audience, none of the 96 papers was more confidently and masterfully presented. Coauthored with C. L. Burke, the paper was titled Measurements of True Dark Conductivities in Ferrocene Crystals.

Pfc Zehler, 24, will complete his 2-year assignment with the Electronics Laboratories in November. Looking toward a career in biochemistry, he has a B.S. degree from West Chester (Pa.) State College and is planning to resume his education at Villanova University.

(The top prize of $500 at the 1962 Army Science Conference was awarded to one of the Army's "soldier-scientists, "Specialist Fourth Class Ira C. Felkner of the U.S. Army Biological Laboratories, Ft. Detrick, Md.

IN THE KEYNOTE ADDRESS of the conference, the Honorable Willis M. Hawkins, Assistant Secretary of the Army (R&D), said that the momentum of U.S. scientific progress is still increasing, and emphasized that this momentum must be maintained "in order to assure the continued superior posture of our military forces."

The major elements of Army responsibility which must determine technical goals, Mr. Hawkins said, are meeting NATO requirements in the European theater, coping with the problems of guerrilla and special warfare in remote areas such as Korea and Viet Nam and, finally, conceiving a defense for the United States against ballistic weapons. He continued:

". . . Having reminded ourselves that we have major technical problems, let us look at the consequences of their solution. The first quandry is that our military tactics—in fact our national tactics—can no longer be built around the latest technical breakthrough. There are too many.

"Today we are faced with having to be selectively intelligent in a supermarket where every shelf seems to contain just the vitamin needed for that ultimate weapon which will permit us to relax in comparative invulnerability.

"Since the price tag on each product is extremely high, we must be intelligent purchasers beyond any previous definition of the specialty.

"Next, since the price is so high, the day is past when any Service can be injudicious about its purchases and hope that its indiscretion will go unnoticed. There is a great deal of Con-

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## Picatinny Scientist Invited To Report on Stress Analysis

William Griffel of Picatinny Arsenal has received an invitation to speak before the American Society of Mechanical Engineers annual convention in September at Los Angeles.

The invitation was based on the society's interest in a new simplified method of stress analysis pertaining to containers under pressure (rocket engines, 155mm howitzer shell) developed by Griffel, a mechanical engineer with the Warheads and Special Projects Laboratory. He has published nearly 100 articles in scientific and technical journals.

His method consists of the use of tables of dimensionless containers which does not require the basic differential equations of shell theory. An engineer unfamiliar with shell theory thus can get accurate answers to stress problems without expending a great deal of time.

## Project Manager Retires, Receives Legion of Merit

The Legion of Merit Medal was awarded to Col John A. Ulrich, project manager for selected ammunition, U.S. Army Materiel Command at a recent retirement ceremony. Maj Gen F. A. Hansen, CG of the U.S. Army Munitions Command made the award.

Col Ulrich began his military career as an ROTC graduate of Stanford University in 1933. He joined the Picatinny Arsenal staff at Dover, N.J. in 1960 as head of the Ammunition Group, and was appointed to the Office of the Chief of Ordnance as project manager for selected ammunition in 1961.

Among honors and awards he earned during 22 years of Army service are the Legion of Merit with Oak Leaf Cluster, Soldier's Medal, Army Commendation Medal, American Defense Service Medal, American Campaign Medal, and the Asiatic-Pacific Medal with Bronze Star for the Guadalcanal campaign.

Col Ulrich has served tours of duty in the Pacific Theater for atom bomb tests, at Frankford Arsenal, at the Diamond Ordnance Fuze Laboratories, and in Viet Nam.

Col Ulrich, left, receives Legion of Merit from Maj Gen F. A. Hansen, CG, U.S. Army Munitions Command.

ARMY SCIENCE CONFERENCE civilian winners for technical papers accept awards from Deputy Assistant Secretary of the Army (R&D) Charles L. Poor; Fig 5, top, military winner, Col Robert M. Hardaway, Walter Reed Army Institute of Research (WRAIR), Washington, D. C., from Stanley S. Hiller, Jr., representing Association of the United States Army, which donated military awards. Fig. 1, W. W. Berning, Army Ballistics Research Laboratories, Aberdeen Proving Ground, Md. Fig. 2, H. C. Allen, Army Missile Command. Fig. 3, J. J. Egli, Army Electronics Laboratories (AEL), Fort Monmouth, N.J. Fig. 4, E. A. Gerber and E. R. Ahlstrom, AEL. Fig. 6, G. K. Gaulé accepts team award for himself, J. T. Breslin, R. L. Ross, and 2nd Lt Roy S. Logan, all from AEL. Fig. 7, J. I. Miller accepts team award for himself, C. E. Williamson, S. Sass and B. B. Witten, all from the Chemical R&D Laboratories, Edgewod Arsenal, Md. Fig. 8, R. G. Buser, team award for himself, J. J. Kainz and J. J. Sullivan, all from AEL. Fig. 9, R. A. Finkelstein, team award for himself, Capt H. T. Norris and Col H. Sprinz, all from WRAIR.

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gressional interest in everything the Services do.

"Coupled with this constant external surveillance is the certain knowledge that in time of peace there will be very little agreement in the total Government complex as to which estimated future problem should be afforded the highest priority.

"Finally, if there is an agreement on the problem, there will be many alternatives on just how to solve it. Furthermore, having selected a solution, there will be proponents of discarded solutions who will haunt the man with the task every time his program experiences inevitable perturbations. Thus, there will be no smooth, major, well-funded and consistently managed programs that extend from concept to a long production in the foreseeable future.

"The world of nations and our industries are increasingly competitive, and our Government still fully democratic, so we can hardly expect any comfortable programs in the years ahead. This will be a real challenge to our technical judgment and our managerial ability."

In other high points of his address, Secretary Hawkins discussed the roles of the U.S. Army Materiel Command and of the Combat Developments Command with respect to providing the type of materiel the combat soldier needs, when and where needed.

Included in listed materiel requirements were equipment geared to the physical environment of the soldier, more versatile mobility vehicles, improved 2-way communication, better reconnaissance devices and techniques, methods of avoiding easy detection by the enemy when the first-shot kill effort against him fails to yield the desired result, and more effective special warfare equipment.

Advances in medicine through expanded research effort to reduce the lost time of a combat soldier due to disease or injury also were discussed by Mr. Hawkins. He said, "Often these capabilities have a greater impact on the ultimate outcome than the weapons and materiel the man carries with him. . . .Antidotes exist but we are in real need of simple innoculation or immunization ideas . . ."

PRESIDENTIAL SCIENCE ADVISER Dr. Donald F. Hornig, whose address at the conference banquet is carried on page 2, headed the list of VIPs and ranking delegates, along with General Frank L. Besson, CG of the Army Materiel Command, and Lt Gen William W. Dick, Jr., Chief of Research and Development.

Commanders of major Army R&D installations included: Maj Gen Frank W. Moorman, U.S. Army Electronics Command; Maj Gen Kenneth G. Wickham, Combat Developments Command Service Support Group; Brig Gen Walter E. Lotz, Jr., director of Army Research; Brig Gen Robert E. Blount, Medical R&D Command; Brig Gen Fred J. Delmore, U.S. Army Edgewood (Md.) Arsenal; Brig Gen J. Wilson Johnston, Army Satellite Communications Agency; and Brig Gen T. J. Hayes, III, director of Topography and Military Engineering, Office of the Chief of Engineers.

The U.S. Navy was represented by Dr. Frank I. Tanczos, Technical Director for Supporting Research, Bureau of Naval Weapons, the Air Force by Dr. Albert W. Hetherington of the Research and Technical Division of the Systems Command, and the Marine Corps by Dr. Alexander L. Slafkosky, Deputy Chief of Staff for Research and Development.

The British War Office sent as its delegate Dr. Walter Cawood, chief scientist, and the Canadian Defense Research Board was represented by Dr. William Petrie, deputy chief scientist. Dr. John L. Farrands, assistant controller for research and development, represented the Australian Department of Supply.

Dean Murrough P. O'Brien, chairman, topped a list of Army Science Advisory Panel members that included Dr. William Van Royen, vice chairman, Dr. Donald G. Fink, Dr. Ernest Volwiler, Dr. Edward C. Stevenson and Dr. John E. Vance, a former chief scientist of the U.S. Army.

The U.S. Department of State representation was provided by Dr. Ragnar Rollefson, also a former chief scientist of the Army and now director of the Office of International Scientific Affairs; the National Academy of Sciences by Dr. Carl E. Barnes, Executive Committee, Division of Chemistry and Chemical Technology, National Research Council; and the

(*Continued on page 10*)

## *Missile Safety Director Attends Meet Set by LBJ*

The safety director for the Army Missile Command was invited to take part in the President's Conference on Occupational Safety in Washington, June 23-25, in recognition of his outstanding professional record.

Thomas Davidson, the Missile Command's top safety expert, has 17 years experience in accident prevention, both in Government service and civilian fields. He is a holder of the Federal Safety Council Award of Merit for outstanding contributions to accident prevention within the Federal Government.

The Washington meeting was convened by President Johnson and Secretary of Labor Willard Wirtz was general chairman. More than 100 volunteer leaders of Government, business, labor and other fields were among about 2,500 participants.

Before coming to Redstone Arsenal, Davidson held posts as safety director for the Army's Jefferson Proving Ground, Madison, Ind., and was a member of the Governor's Industrial Traffic Safety Council in Indiana.

Thomas Davidson

## 2 Fort Dietrick Scientists Win Society's Microbiology Awards

Army scientists at Fort Detrick are the winners of the two awards made annually by the Maryland Branch of the American Society for Microbiology for contributions to the advancement of microbiology.

The J. Howard Brown Student Award was presented recently to William C. Wheeler, of Fort Detrick's Special Operations Division. The award is made to an individual at the pre-doctorate level whose scientific accomplishments are believed above those normally expected at that level.

Dr. Rudolph J. Allgeier, Office of the Director of Development, received the Barnett Cohen Unlimited Award, offered at the post-doctoral level for contributions over a period of years.

The presentations were made by Dr. Donald E. Shay, University of Maryland, who is chairman of the Society's Special Awards Committee.

Presently on leave of absence from Fort Detrick, Mr. Wheeler is preparing to receive a doctorate degree at Johns Hopkins University in Baltimore, Md. He is under the tutelage of Dr. John H. Hanks, professor of pathology and director of the Leonard Wood Leprosy Research Laboratory.

(*Continued from page 9*)

National Science Foundation by Dr. John M. Ide, head of the Engineering Section.

Other dignitaries present included Dr. Eugene Konecci of the National Aeronautics and Space Administration, Col Richard Wolfe of the Atomic Energy Commission, Dr. Stuart W. Crozier, executive director of the Materials Advisory Board, National Research Council, and Dr. Stuart M. Sessoms, deputy director of the National Institutes of Health.

Among the Army's major contract research organization representatives were Dr. Barkley Rosser, director, Mathematics Research Center, U.S. Army, at the University of Wisconsin; Dr. Theodore Vallance, director, Special Operations Research Office, American University, Washington, D.C.; and Dr. Meredith Crawford, director, Human Resources Research Office, George Washington University, Washington, D.C.

PRESIDING CHAIRMAN Dr. Harold C. Weber, introduced by Dr. I. R. Hershner, general chairman of the conference, commented that the panel of judges responsible for selection of the award-winning papers had been "extremely favorably impressed by their general overall superior quality." He stressed the broad diversity and depth of Army research as reaching into all scientific disciplines and subfields.

Dr. Weber served as chairman of the panel of judges, consisting of Donald G. Fink, general manager, Institute of Electric and Electronics Engineers; Dr. Ernest H. Volwiler, consultant and former chairman of the board, Abbott Laboratories; Dr. Charles C. Lauritsen, professor of physics, California Institute of Technology; Dr. Walter G. Nungester, chairman, Department of Physics, University of Michigan Medical School; Dr. John E. Vance, professor of chemistry, New York University; and Dr. Edward C. Stevenson, professor of electrical engineering, University of Virginia.

The tribute to the work of the judges' panel was stated in similarly glowing terms by Dr. Hershner when he commented on contributions to the success of the conference by the four sessions chairmen, namely:

Dr. Marion B. Sulzberger, technical director of research, Office of The Army Surgeon General; Dr. Craig M. Crenshaw, chief scientist, and Charles H. Zimmerman, chief engineer, U.S. Army Materiel Command; and Dr. Gilford G. Quarles, chief scientific adviser to the Chief of Engineers.

# Army Science Conference Impresses R&D Reservists

Fifteen selected Reservists, representative of USAR Research and Development Training Units in 11 States ranging the length and breadth of the Nation, expressed themselves as "tremendously impressed" with their experience as observers at the 1964 Army Science Conference.

All of the men chosen to attend the conference could point to their academic engineering or scientific qualifications to evaluate the merit of the 96 technical papers presented.

Seven boast Ph. D. degrees, including three professors and one instructor. One has a master's. Except for three employed at Army in-house laboratories, and one with the National Bureau of Standards, all have responsible positions in industry or are associated with universities.

Heading the group was Col Harry L. Willard, 1332nd USAR R&D Training Unit, New York, N.Y., a top research executive with Union Carbide Corp. Col J. C. Olson, 5007th Unit, St. Paul, is a professor at the University of Minnesota with a Ph. D. in bacteriology.

Lt Col Garland T. Riegle, 5135th Unit, Mattoon, Ill., is a professor at Eastern Illinois University with a Ph. D. in entomology. First Lt Bruce B. MacLachlan, 5010th Unit at Laramie, is employed at the University of Wyoming and has a Ph. D. in anthropology.

Col Walter H. Schaeffer, 6155th Unit at Fort Lawton, Wash., is a professor at the University of Washington and has a Ph. D. in forestry. Capt Harris Bruns, employed at the University of Illinois and a member of the 5000th Unit at Urbana, has a brand new Ph. D. in chemistry, as has Capt Franklin E. Niles in physics, 4015th Unit in Austin where he is employed at the University of Texas.

Capt Leon J. Brown, 6151st Unit at Sacramento, is using his B.S. degree in mechanical engineering to good advantage with Aero-Jet General Corp., and 1st Lt Mack W. Dowdy found employment with Georgia Institute of Technology after earning an M.S. degree in mechanical engineering. He is a member of the 3251st Unit in Atlanta.

The Commonwealth of Massachusetts was represented by one of its employees, Lt Col M. C. Gowdy, who is a professional civil engineer and a member of the 1002nd Unit at Springfield. Lt Col William V. Lobenstein, who has a Ph. D. in chemistry, is with the National Bureau of Standards in Washington, D.C., and is a member of the 3291st Unit in Alexandria, Va.

Three Army in-house laboratory employees whose mobilization designation assignments in event of a national emergency might mean relatively little change in their present way of life, are Col Benjamin D. Pile, 1332nd Unit in New York, now with the U.S. Army Medical Equipment Laboratories; Lt Col J. Thomas Blair, 5001st Unit at Inkster, Mich., with the U.S. Army Mobility Command; and Lt Col Adolph H. Humphreys, 3291st Unit at Alexandria, Va., with the U.S. Army Mobility Command's Engineer R&D Laboratories.

When Lt Col William N. King, 1330th Unit in Rochester, N.Y., wants refreshment after a hard day's labor, he does not have far to go. His knowledge as a chemical engineer is serving the Genesee Brewing Co.


**USAR RESEARCH AND DEVELOPMENT TRAINING UNIT members who attended 1964 Army Science Conference at the U.S. Military Academy, West Point, N.Y., June 17–19, and whose full names, rank, professional qualifications and unit designations are covered in the above article, are (L. to R., first row) Pile, Blair, Loebenstein, MacLachlan, Riegel, King, Gowdy; (Rear) Schaeffer, Olson, Willard, Dowdy, Brown, Humphreys, Burns and Niles.**

## General Besson Becomes Youngest 4-Star Leader; Former Deputy Advances

General Frank S. Besson, Jr., 54, became the youngest 4-star general in the Army May 27 but did not begin wearing his insignia until June 9. Chairman of the Joint Chiefs of Staff General Earle G. Wheeler pinned on the fourth star, making him the 75th to achieve that rank.

Twenty years ago, in 1944, General Besson became the youngest brigadier general in the Army Ground Forces. When he took command of the U.S. Army Materiel Command upon its establishment in 1962, he was a major general.

The only similar precedent for his new rank dates back to World War II when General Brehon B. Somervell gained his fourth star during the last few months of assignment as head of the Army Service Forces.

The Army Materiel Command may be considered an expansion of the Service Forces in that its functions include research, development, testing and evaluation as well as supply and distribution.

The order that made General Besson a 4-star leader also elevated his former Deputy CG from 2-star rank. Lt Gen Jean E. Engler is now CG of the U.S. Army Supply and Maintenance Command. General Wheeler also pinned on General Engler's new insignia.

Not without firm foundation has the U.S. Army Materiel Command which General Besson heads been termed "the most powerful command ever created in peacetime." Invested with most of the traditional roles formerly assigned to five of the Army's seven Technical Services, the AMC embraces a network of 233 installations.

Involved in the Materiel Command operations are approximately 156,000 civilian personnel and 20,000 military officers, a total inventory currently averaging about $18.3 billion, and estimated annual expenditures of approximately $8.0 billion.

From March 1958 until he assumed his present position, General Besson served as U.S. Army Chief of Transportation. During the four previous years, he was assigned to Supreme Headquarters, Allied Powers Europe (SHAPE), first as assistant chief of staff for logistics and later in the same capacity for programs. His skill and leadership in formulating logistics plans and overall programs to meet the complex requirements of the 15 nations of the NATO alliance earned him the Distinguished Service Medal.

**Fourth star is pinned on General Frank S. Besson, Jr., by General Earle G. Wheeler and Mrs. Frank S. Besson, Sr., the general's mother.**

**New Chairman of the Joint Chiefs of Staff General Earle G. Wheeler and Mrs. Engler pin 3rd star on Lt Gen Jean E. Engler, CG of the USASMC.**

Born in Detroit, Mich., son of the late Col Frank S. Besson, Sr., General Besson graduated from the U.S. Military Academy in 1932, beginning his career in the Corps of Engineers.

Following early assignments with the Corps on construction projects and in research and development activities, from 1940-43 he was a member of the Engineer Board at Fort Belvoir, Va., and later chief of the Development Branch, Office, Chief of Engineers.

In the latter assignment, he was in charge of development of such World War II equipment as portable steel airfield runways, portable pipelines, the steel treadway, floating and fixed bridges, mines, mine detectors, and armored bulldozers.

In December 1943, General Besson was assigned as assistant director and general manager of the Third Military Railway Service in Iran and in the spring of the following year assumed full command.

Despite many difficulties, the railroad under the Third's supervision surpassed all previous performance records. In the peak period during the month of July 1944, more than 233,000 long tons of critical war material were transported from southern Iran to Soviet transfer points in the north. The supplies pouring through the corridor enabled the Soviets to drive the German army from Russia.

For leadership of the Third Military Railway Service, General Besson was promoted to brigadier general and awarded the Legion of Merit.

In his next assignment he directed rail operations of U.S. occupation troops in Japan before assignment as chief, Civil Transportation Section, Supreme Headquarters, Allied Powers in the Far East (1946-48).

Returning to the United States in 1948, he served as Assistant Chief of Transportation for nearly five years and pioneered a number of concepts aimed at injecting greater speed and efficiency into the transportation system. He carried these further after assuming command of the Transportation Center and School at Fort Eustis, Va. General Besson holds an M.S. degree from the Massachusetts Institute of Technology.

# AFIP Experiment Hailed as New Approach to Immunologic Need

*(Results of research reported in the following article earned a 1964 Research and Development Achievement Award, announced this month.)*

Clues to the answers to problems of transplanting human organs may lie in a dramatically radical series of experiments being conducted by researchers at the Armed Forces Institute of Pathology, Washington, D.C.

The research program involves operations on ovine fetuses (unborn sheep) outside the anesthetized mother's uterus. It may shed light on how the adult develops immunity to infectious diseases and how transplanted organs from one human to another are rejected by the recipient.

The studies are being conducted by Dr. A. M. Silverstein, a civilian immunologist, and Capt K. L. Kraner, an Air Force veterinarian, for the Army Medical Research and Development Command.

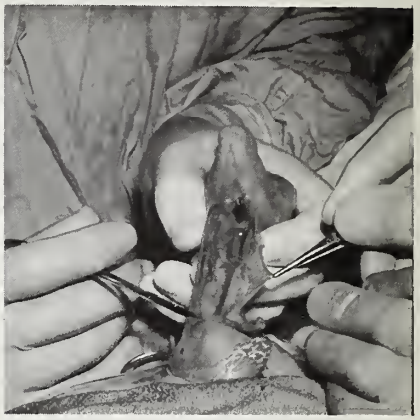
Capt Kraner reported on the studies in a technical paper presented at the 1964 biennial Army Science Conference at the United States Military Academy at West Point, N.Y., June 17-19.

As the first Air Force officer who has presented a paper at the ASC, he was resoundingly applauded. Session A Chairman, Dr. Marion B. Sulzburger, technical director of the Army Medical R&D Command, termed the studies "a magnificent new approach to immunologic concepts."

Basically, the procedure involves completely removing the tiny fetus from the mother's uterus, leaving it attached only by the umbilical cord. While out of the uterus, the fetus can be immunized, grafted with tissues from another animal, or have its thymus removed. (The thymus is an organ that plays a major role in development of immunity in the animal).

The fetus is then replaced into the mother's uterus and at a later date is again removed to allow the doctors to study the response of the fetus to antigenic stimulus—what it will respond to, when it will respond, and to what type of stimulus. By studying the development of immunity in the unborn lamb, the investigators hope to learn more about the basic mechanisms of immunity in the adult.

The researchers are now beginning similar operations on fetal monkeys whose characteristics more closely resemble man's. This is expected to provide considerable new information on the development of immunity ot disease and the body's ability to accept foreign tissue.



**(Upper left) Graft of skin is placed upon leg of a fetal lamb. Leg is brought out of uterus for the operation, then returned without interruption of pregnancy. (Upper right) Neck of fetal lamb is brought out of uterus to permit thymectomy, the removal of thymus, an important tissue in fetal development. (Center left) Thymus tissue is removed from chest of lamb, where it is attached to the heart. (Center right) Young fetal lamb, 41 days gestation, is exposed in amniotic membrane to permit immunization and allow study of fetal response in uterus. (Lower right) Young lamb, 45 days gestation, is delivered by Caesarian and bled from umbilical cord days after immunization to study reaction.**

The values of the program are at least 3-fold in that they:

- Are expanding the basic knowledge of the body's responses to immunization which could lead to improved immunization processes;
- Might provide better approaches to immunization of the newborn to afford more protection against infectious diseases to newborn babies;
- May give clues to the solutions of some of the problems in skin and organ transplantation which has obvious potential application in military surgery.

Perhaps the most startling result of the experiments is that the operations do not interfere with pregnancy and do not impede the development of the fetus. The lambs survive and mature.

"The amazing thing is that we can

do this (remove the fetus from the uterus) virtually with impunity," Dr. Kraner said. "Initially, we doubted the fetuses would survive, but they do. We have performed almost 100 operations of this type, many of them repeated on the same fetus with very few failures. The development of these animals apparently has not been impaired."

Dr. Kraner added that with the umbilical cord intact, the fetus is much hardier than suspected. In many cases, the undisturbed twin offers a comparison in development.

Contrary to the earlier belief that an animal cannot develop immunity before birth, these studies have shown that the fetal lamb can form protective antibodies very early in gestation. Ability to respond to others does not develop until after birth.

The fetal lamb is not the only developing animal that can produce an immunity in utero. A study on aborted fetuses by these same investigators has shown that when the human fetus develops congenital infectious diseases, such as syphilis or toxoplasmosis as a result of maternal infection, it also attempts to protect itself by an immune response. Silverstein and Kraner express the hope that clarification of these processes in the fetus may provide clues for improving immunization in new borns.

Another major finding of the research is that immunity to disease is not the only function possible in the fetus. The fetus can also reject grafts of tissues and organs. The scientists have proven that the fetal lamb can reject skin grafts any time after the middle of the gestation period.

The study of how the fetus rejects a graft in its special intrauterine environment has already clarified some of the basic mechanisms involved in the immunologic rejection of foreign tissue. The scientists are cautiously optimistic that these experiments may contribute to the ultimate goal of permitting successful grafting of kidneys and other organs from one individual to another.

Techniques for transplanting organs from one human to another have been receiving a growing amount of attention both from the medical profession and the public in the past few years. This interest, at least on the part of the public, has been whetted by occasional and widely publicized successes in kidney transplants.

Transplants however, have involved the use of immune-suppressive drugs which not only lower the body's natural tendency to resist foreign tissue but also its resistance to other foreign substances such as a cold virus, for instance, accounting for well-publicized failures.

Ideally, transplants would be possible without the use of those drugs which lower the body's resistance to various diseases. Kraner and Silverstein are trying to find out if and how that would be possible.

The present research program has been underway for five years. Investigators adhere to "Principles of Animal Laboratory Care" as established by the National Society for Medical Research.

# 300 Oral Surgeons Attend WRAMC Parley on Trauma

More than 300 civilian military oral surgeons from all parts of the United States gathered at Walter Reed Army Medical Center June 8 and 9 for a Conference on Trauma Related to Oral Surgery.

Sponsored jointly by the American Society of Oral Surgeons and the U.S. Army Dental Corps, the meeting was chaired by Dr. S. Elmer Bear of Richmond, Va. Dr. John S. McQuade, president of the American Society of Oral Surgeons, and Maj Gen Joseph L. Bernier, Assistant Surgeon General and chief of the Army Dental Corps, welcomed the conferees.

Principal speakers included Dr. Charles A. McCallum, Jr., of the University of Alabama, on Supportive Care of the Injured Patient; Dr. Raymond E. Boudreaux of Loyola University, on Management of Fractures in Children; Col William B. Irby, D.C., of Letterman General Hospital, San Francisco, Calif., on Fractures of the Edentulous Mandible.

Lectures included Condylar Fractures, Dr. O. Lee Ricker of Grand Rapids, Mich.; a Preliminary Report on Five Years of Research on Condylar Fractures, Dr. William L. Schemmel of the University of Texas; Intra-Oral Splints, Dr. Harold E. Boyer of the University of Louisville; Extra-Oral Pin Fixation, Dr. Merle L. Hale of University Hospitals, Iowa City, Iowa; and Use of Kirschner, Stader and Stedman Pins, Dr. William F. Harrigan of the New York University College of Denistry, New York City;

Use of Bone Plates, Dr. Marsh E. Robinson, University of Southern California, Los Angeles, Calif.; Middle Face Fractures, Dr. Robert V. Walker, University of Texas, Dallas, Tex.; Blow-Out Fractures, Dr. Stanley L. Lane, New York City; Soft Tissue Injuries, Dr. James R. Hayward, University of Michigan, Ann Arbor, Mich.; New Concepts in the Physiology of Bone Repair, Dr. Lent C. Johnson, Armed Forces Institute of Pathology, Washington, D.C.; and Bone Grafts in Trauma, Dr. Leroy W. Patterson, St. Louis (Mo.) University.

# Stanwix-Hay Takes Key DoD Technical Data Post

(*Continued from page 1*)

Carlson, and to various other DoD offices concerned with RDT&E information processing, is how their respective responsibilities will be defined and more effectively coordinated.

To the unitiated, RDT&E stands for research, development, test and evaluation, each phase of which involves scientific and technical information and data of vast import to the welfare of the Nation. Cost of preparation and processing this information has been roughly estimated by knowledgeable leaders as high as about $2 billion annually.

The DoD announcement stated simply that in his new duties, General Stanwix-Hay will be responsible for policies and basic DoD procedures in the field of technical logistics data acquisition and utilization, including storage and retrieval systems. He also will administer the DoD-wide standardization program.

Success in his assignment as director of the Defense Contract Administration pilot office won General Stanwix-Hay, 53, the lead feature article in the May 1964 edition of *Armed Forces Management* magazine —and his picture covering most of the front page. The title: Contract Administration Pilot Test Underway . . . General Stanwix-Hay's Revolution in Philadelphia.

Long experience in the field of logistics, including a one-year tour as commander of the Army Electronic Materiel Agency in Philadelphia prior to his present assignment, prepares the general for his new duties. A graduate of the University of Florida, the Armed Forces Staff College, and the Industrial College of the Armed Forces, he had extensive combat experience in Africa and Europe during World War II.

Much of the general's experience has been with the Army Signal Corps, starting with an assignment in 1948 to what is now the headquarters of the Army Electronics Command at Fort Monmouth, N.J. In 1951 he moved to the Office of the Chief Signal Officer in Washington, and later served on the staff of the Deputy Chief of Staff for Logistics.

In September 1963, he became Deputy Chief Signal Officer.

*No. 1 Federal Science Leader Acclaims In-House Labs. . .*

# Presidential Science Adviser Expresses Views at Army Science Conference

(*Continued from page 2*)

source issues have such diverse aspects that no less than 28 agencies of the Federal Government do some work in this area. The problem, then, is how to get anything that one might consider a coherent national program.

Another big problem is that of environmental pollution. Industrial wastes and pesticides threaten to render much of our water supply dangerous for wildlife, for fish, and in some cases for humans. We are polluting the atmosphere as well. The smog problem is Los Angeles is severe but not unique; it occurs in big cities all over the country.

These are problems which involve diverse and often conflicting agencies. For example, the Department of Agriculture has a central interest in promoting the use of pesticides while the Department of Health, Education and Welfare has a central interest in protecting us from the consequences of their use.

Somehow, we must trod a purposeful national course and this course is deeply affected by Government actions. The Federal Government supports 70 percent of all university research in this country. . . .This is such a big proportion that the magnitude and character of this expenditure becomes a matter of major national policy. The Federal Government cannot ignore its powerful impact upon the development of the Nation's colleges and universities and, in particular, the graduate schools.

We have many national interests in science which get out of the strictly scientific area. For example, our military posture is now so much affected by science and technology that they are strongly involved in our total international situation. Arms control is not strictly a matter for politicians, as you know. The problems of arms control are to a considerable extent technical. When a proposal is made to verify or inspect a freeze or a cutback in armaments, the essential question becomes, "What do you mean by the words verify and inspect?" If one asks in what ways the controls might be evaded, the questions become largely technical questions. So there is a deep interrelation between scientific and technical matters and what are ordinarily considered political matters.

Science gets involved, occasionally, in foreign policy—such matters as the Mexican water question, where ways must be found to do something about the excessively salty water carried across the Arizona border by the Colorado River. It gets involved in the technical assistance programs of the Federal Government to the underdeveloped areas of the world. There is a big Federal involvement in international science—the formal and informal relationships among nations developed through participation in scientific organizations such as The International Council of Scientific Unions, the World Meteorological Organization, and the World Health Organization. Giving consideration to all the ways science and technology enter our national life, it has been found expeditious to have an Office of Science and Technology located directly in the White House.

I would like to spend just one minute mentioning to you what it is, then, that the Presidential Science Adviser and his office consist of and what this so-called "Czardom" is actually like. As has been mentioned, the Science Adviser has four titles. That fact is relatively unimportant. One of them is Special Assistant to the President. I cannot testify before the Congress because to do so would impair a relationship with the President which must remain confidential. Another role is Director of the Office of Science and Technology in the Executive Office of the President. Since that office was created by the Congress, I must, as the Director, make myself accessible to the Congress and its committees. This occasionally poses delicate questions. . . .

According to Reorganization Act II, the function of the Office of Science and Technology is to advise and assist the President on all major policies and issues pertaining to or affected by science and technology. A second responsibility is the evaluation and coordination of all of the research and development activities of the Government.

For the latter purpose I have a staff of 20 people. They are very, very good people, I might say, but the size of the staff is the first limitation on the Czardom. . . .It is obvious that whatever is implicit in the Act of Congress which established the Office, it can, in fact, concern itself with only very few major policies and issues.

The Office works in two different ways in trying to assemble the best possible advice for science and technology in the Government.

Dr. Donald F. Hornig

On the one hand, it gets help through its contacts with the external scientific community. This is particularly true of the President's Science Advisory Committee, which is a group of 18 distinguished scientists appointed for 4-year terms. Of course, even 18 does not bring the range of expertise that is demanded. Necessarily, in fact, they work, in turn, through consultants drawn from throughout the scientific community —some 300 of them, usually employed in the form of Ad Hoc panels on specific topics.

Contacts with the various agencies of the Federal Government is maintained through the Federal Council for Science and Technology, which consists of the senior policy-making technical people from each of the agencies. For example, the Department of Defense is represented by Dr. Harold Brown and the Atomic Energy by its chairman, Dr. Glenn T. Seaborg. Through this mechanism our Office attempts to keep in touch with problems throughout the Government, to anticipate problems and to discharge our duty to advise and assist the President.

One of our concerns is the various research and development programs which are carried on in the Government and, of course, the biggest single one is that of the Department of Defense—about $7 billion, I believe, was spent on R&D in the last year.

We have been deeply concerned and interested in the problems of the in-house Government laboratories and, in particular, I would like you to know of my interest in the Army laboratories. I think they have a very important role to play in the times ahead of us. There may be a day

when we can do without a security force, but it is not yet in sight and for the time being, certainly, the Nation requires a strong and powerful Army.

Our Nation has gone through a period of great change or evolution through the last war and in the period since. During the brief time when we possessed a nuclear monopoly, we became less concerned about our conventional capabilities and began to look for the answers to all problems in nuclear weapons. This attitude was advanced further by the development of accurate intercontinental ballistic missiles and there was a period when all conflicts of the future was widely thought of in terms of major strike nuclear - carrying ballistic weapons.

However, we have now arrived at a situation in which both sides possess nuclear weapons. Before long there may be others, not aligned with either of the present sides, and this has changed the entire situation drastically. It has become fairly clear that nuclear weapons and missiles represent an exaggerated response to many of the political and strategic problems which face us in the world.

Being an exaggerated response, nuclear weapons, therefore, become useless to us in many situations. It has become clear that we need a capability to face a very wide variety of threats. We need capabilities which while sufficient to gain our objectives are not likely to bring an expansion of the conflict. The prevention of escalation in any of the limited confrontations which we have faced in recent times, and which we will face in the future, requires extreme flexibility in our weapons systems.

Under present circumstances our Army, as it always has for that matter, must be prepared to fight wars in unfamiliar and difficult climates and terrains. We still have a tremendous reliance upon our military capabilities in a wide variety of forms, and not merely upon those weapons which are the fruits of our nuclear and missile technology. This is not a return to the past; we are not becoming old hat; the fact is that the technological revolution in warfare is clearly not over.

We live in a period where everything about our economy and the structure of our country is in the midst of rapid change. It is a period of the greatest innovation we have ever experienced and there is absolutely no reason to anticipate that modern science and technology will not continue to revolutionize the practice of warfare.

However, the acquisition of modern military capabilities depends upon effective development programs to meet military needs. Beyond that we must have research programs—ingenious, creative, forceful research programs —which will uncover the new ideas, new technical approaches and, in short, lay open new opportunities. We must grasp these new opportunities which science presents to the military services. . . .

Through the work of Army scientists, many fields which are important to the Army can be developed and made interesting to civilian laboratories outside the Army. Army laboratories, in many complicated ways, provide the internal technical competence to give advice and direction to the large contract programs in research which are also carried on by the Army.

The Army laboratories, I feel, must play an active role in the analysis and management system as well as in development and test programs. In short, as far as I'm concerned the Army laboratories exist for only one purpose—to enhance the effectiveness of the Army.

To do that, a great variety of work is needed—a variety which is embodied in the program of this Conference. I wish I could have attended the meetings, but I have read the abstracts of many of the technical papers and there is a richness and a great variety in what is being done. I should not say that I found more than I had anticipated because I did not know what to anticipate, but there is certainly very interesting and solid work going on. To achieve our goals, we need a proper mix of development work and research work. I have no prescriptions, but I am sure that this is all well in hand in the Army.

I would like to emphasize the importance of the research components particularly, in technology, in physical sciences, and in medicine, to lay the foundation for military advances we cannot yet anticipate. One cannot carry on a research program, as most of you appreciate, purely on the basis of needs and requirements. Research progress lays out the opportunities to be exploited in meeting requirements and makes possible effective long-range military planning. . . .

I am aware of many of the important contributions which the Army laboratories have made, such as the work on infrared technology at Fort Belvoir, of the work on titanium alloys, the early work on computing machines at the Ballistic Research Laboratories including the development of the ENIAC computer, the important work on communications, such as pulse code modulation signal transmissions, and the important work of the Army Medical Corps.

I have become particularly interested in the questions of remote area medical problems in a world in which we conduct limited actions in many parts of the globe. We must move into remote areas where soldiers face unexpected diseases for which they have built up no immunities and for which adequate medical research is not yet being carried out. This is a worrisome thing. I am just learning about many of these things and I was shocked to find that 83 percent of the men hospitalized in Korea were medically hospitalized rather than as combat casualties.

Elsewhere, our forces were practically immobilized after two weeks in Lebanon. The United Nations Forces in the Congo were seriously hurt by disease, although I might note, in that case, they came to the American Army for advice. In Viet Nam, at the present time, I understand that during the rainy season we have some 1,500 hospital cases per 1,000 men per year. This is obviously a serious rate and represents a very serious decrease in the effectiveness of forces. It seems clear to me that there is still a major job to be done in this field of research despite the high quality of work which has been going on.

What I conclude, then, is that there is a very big job to be done on all fronts—in the development work, in the medical work, in the fundamental scientific research which goes on in many laboratories and which is the backup for all of the other activities. . . .

Despite their successes, all Federal laboratories do have some problems; for instance, they show up in the recruitment of new workers and when one is in a university one hears a lot of stories about the nature of the Federal Service. Professors tell their students that competence does not get recognized in the complicated organizational procedures of the Federal Services. It is said by those who don't know that administrative restrictions sometimes inhibit initiative.

Sometimes it is said that in the Federal Service a scientist must become an administrator to advance. Sometimes it is said that in the big Federal research and development organizations it takes forever to get decisions made because important matters must pass up through layers of decision-making bodies. We all know this to be greatly exaggerated but I hope we can do something about

(*Continued on page 38*)

# Army Interest in Chemical Research Encompasses Broad Area

By Lt Col Louis G. Klinker and Dr. F. W. Morthland
*U.S. Army Research Office Staff Scientists*

"What are the chemical and chemical engineering research programs in the Army?" is a query of broad general interest not easily answered—certainly not with the brevity anticipated by the asker. Since chemical science is fundamental to all research and development endeavors, the identifiable programs supported by the Department of the Army are huge, with may ramifications. Integrated into one package, the total effort comprises a multimillion dollar activity.

Army chemical or chemical engineering associated with research and exploratory development (defense terminology for applied research) may be grossly subdivided into nine categories related to functional areas, admittedly arbitrary. Interfaces between these fields are often broad, with no sharply defined lines of demarcation.

The categories are: (1) fundamental or basic research; (2) the chemistry of meta-stable or high-energy content materials used for propellants, explosives, pyrotechnics and the like; (3) the chemistry of power sources to include storage and conversion techniques; (4) chemical and nuclear weapons and defense; (5) the chemistry of deterioration of materials and Army materiel; (6) materials for intelligence, surveillance, and counter-surveillance devices; (7) studies in support of the individual soldier—his normal requirements for food, clothing and shelter, as well as his medical support; (8) those specialty items required for combat support or supply improvement—insecticides to lubricating oils; (9) general materials used in weapons, mobility devices, etc.

Category (9) it is realized, is exceedingly broad, covering materials not mentioned in the other divisions. In fact, it is listed partly to prevent the total list from running on *ad infinitum*. Inclusion serves another purpose in that it collates those many phases of Army equipment in which there is a less immediate bearing of chemical research on the equipment operation or materials application.

The list indicates that the scope of the Army's program is tremendous—as it must be for a mission requiring ability to operate anywhere, anytime, and with any type of equipment. The best way to emphasize the parameters of this scope is to reduce them to recognizable terms, that is, to describe briefly each field and follow this with a tabulated review chart.

*Basic Research* is the key to the future. An active basic research effort in chemistry, programed and supported by the Army, furthers Army interests in two ways. It ensures a continuing supply of new knowledge upon which future technological progress will depend. It also stimulates the scientific staff to keep aware of general progress pertinent to Army interests, thus avoiding pitfalls of technological obsolescence.

*Meta-stable and High-energy Materials* are more obviously related to Army needs than are some others to be discussed. They include explosives and the propellants to deliver them on target as well as the exotic materials used for normal functions—pyrotechnics and smoke generators for signaling and concealment, and the common items used for unusual functions, i.e., gasoline used as a weapon.

Many problems remain for the chemist to solve. There is a constant need for new materials, concepts, or physico-chemical phenomena to exploit. From the chemical engineer, the Army needs new methods of formulation, stabilization, production, and means for initiation of desired action.

With respect to matches and gunpowder, for example, we still do not know the basic mechanics involved in storage and release of energy by these compounds. Coupled to the problem of the desired quick and useful release of energy is the prevention of premature release. Stability and safety requirements for field Armies have often denied us the use of otherwise excellent materials.

*Power Sources.* The modern Army is greatly dependent upon utilization of power in forms other than those of its ordnance devices. Major campaigns of World War II were plagued and delayed by difficulties in supply of fuels for power-consuming equipment. The fuel requirements picture has not improved substantially. Each new, desirable device for signaling, target acquisition, or transport adds its need for a power source. A continuing search is delving into possible new and novel fuels, methods for conversion of chemical energy to forms required by the various devices, and compact means to store the necessary energy until used.

**Research In Review...**

*Dr. C. Jelleff Carr, whose article last month initiated this series of special articles, was awarded an honorary doctor of science degree by Purdue at the recent 112th commencement exercises. Shown (left to right) are University President Frederick L. Hovde, Dr. Carr and Dean Glenn L. Jenkins, Purdue School of Pharmacy and Pharmacal Sciences.*

*This series of by-lined reviews by leading Army scientists will deal with areas of research considered of broad general interest. Emphasis will be on the future military applications of research in specific disciplines and interdisciplinary areas. To be easily readable and understandable, the writing style will be simple and in layman's language.*

*The articles will be in the general nature of state-of-the-art reports or summaries in widely diversified areas of scientific activity in which the Army is engaged, encompassing virtually all of the major fields of research endeavor. Currently, the Army is involved in approximately 4,500 research tasks, including those in foreign countries.*

*Initial articles in the series will be prepared by scientists of the U.S. Army Research Office, OCRD, over a period of several months. As the tone, style and purpose of the articles become generally known, contributions of similar articles from leading scientists, engineers and administrators throughout the Army will be invited.*

The Army has an active program in such fields as fuel cells of all types, thermoelectric converters, magneto-hydrodynamic generators, as well as ways to improve the performance of more conventional devices. Today many devices require power supplied in the form of electrical energy. This opens new ways of providing power but complicates the logistics system. Finally, major unsolved problems remain in the discovery of materials which will permit exploitation of known principles to generate power.

*Chemical and Nuclear Weapons and Defense.* The use of chemical agents on the battlefield to affect the performance of man, his equipment, his animals, or food crops has a major role in controling the scale of future conflict. Chemical agents can be selected for lethal effects or for spontaneously reversible, incapacitating effects, thus providing an arsenal of potential weapons complementary to conventional weaponry. Availability of such an arsenal provides an adjunct to the nuclear deterrent to help maintain peace among major powers.

Associated with chemical and nuclear capabilities is the requirement for protection against such weapons. Thus the whole fields of pharmacology, toxicology, and chemotherapeutics have been mobilized to develop means for prophylaxis and therapy of the effects of such agents. A prime target for research is the development of chemical prophylaxis to permit the Army to operate freely on the nuclear battlefield by reducing sensitivity to ionizing radiation.

*Materials Deterioration.* The military environment greatly compounds the effects of the normally encountered forces which degrade the performance of materiel and materials. The enemy is most anxious to render one's equipment inoperative, a desire abetted by natural forces and occasionally by careless or poorly trained operators. The Army seeks an understanding of the chemistry of both gradual and catastrophic deterioration, friction, wear, and biological attack.

Understanding of these mechanisms will lead to better methods of protection against these forces. Reduction in the effects of deterioration will have major implications to logistic requirements. Closely related is the application of such forces to the development of weaponry capable of accelerating degradation of materials.

*Intelligence and Surveillance* is an area that immediately brings to mind materials for new, smaller, exotic detection and signaling devices. However, there are also a number of possibilities for such functions which are directly active by chemical or physiochemical means. These may include chemiluminescent materials, smokes, subtle changes in ambient chemical concentrations, etc.; also, countermeasures which defeat electromagnetic probing by the enemy are urgently needed. High-speed processing of wet or dry photographic materials—the heart of many surveillance systems—is a major problem for the chemist.

*Support of the Soldier.* Basically, the Army is Man operating in an inimical environment, partially natural and partially enemy made. He must be fed at reasonably regular intervals, sheltered from his environment by a minimum of heavy or bulky equipment, and protected from disease, or, upon failure of protective measures, treated effectively and rapidly by the best medical means available. Merely to insure his proper nutrition requires a great deal of chemical research.

To reduce logistical problems of field operations, two major innovations are being explored by the Army. These are: freeze-dehydration of foods to permit reduction in weight and simplified reconstitution without extensive preparative equipment; and preservation from bacterial attack by irradiation with ionizing radiation.

In both cases, effects on nutrients, flavor elements, packaging materials, and enzyme contents of the foods must be carefully explored since the soldier may be totally dependent upon this source of food, with a minimum of opportunity for supplementation with fresh items. One day, perhaps, the food chemist will provide nutrients in compact form by non-agricultural means.

The provision of the soldier's lightweight clothing, shelter and comfort items calls into play the best talents of all materials scientists, in an effort to "take the load off his back." Many new protective systems are being devised and each usually adds to the load of the fighting man. Many items or finishes are incompatible with each other, and so the search of the chemist continues.

The many branches of chemistry

(*Continued on page 36*)

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Lt Col Louis Gaylord Klinker, chief of the Chemistry and Materials Branch, U.S. Army Research Office, at the time this article was written, will report July 31 for a new assignment at Hq., Military Assistance Command, Viet Nam.

Promoted to full colonel in the Army Reserves in June 1964, he is the author of a number of articles in leading professional journals. Ten patents were granted on metallurgical processes he developed while in private industry.

From 1937-42 he designed, built and operated, as superintendent, the Johnson Bronze Co. plant for production of metal parts and bearings from bi-metal produced from metal powder. Graduated from Purdue University in 1934, he continued graduate work at Youngstown (Ohio) University in metallurgy and metallography (1938-40). He was a research engineer with Glidden Co. (1934-37).

During four years of World War II service his skills in metallurgical fields were used with the Army Tank Automotive Command (ATAC) in Detroit. Following his discharge, he returned to the Glidden Co. as chief engineer of the metals refining plant, Hammond, Ind., until recalled to Army duty (1953).

For the next four years he was deputy chief of the National Engineering Branch, Army Ordnance Ammunition Command, and specifically concerned with product process and inspection engineering on shells, bombs, rockets, JATO systems, and other highly classified Army weapons capabilities. His next assignment (1957-60) was chief of the Chemistry and Materials Branch, U.S. Army European Research Office, Frankfurt, Germany.

In his Viet Nam assignment with ARPA, Col Klinker will serve with a field unit of the Joint Research and Test Agency (JERATA), responsible for providing the Viet Namese with a research and development capability. He will work closely with a similar ARPA field unit in Bangkok, Thailand, developing the pattern by which other such remote area conflict units may be activated.

Col Klinker is a graduate of the U.S. Army Management School, the Army Logistics School (Army R&D administration course), the CBR School, and the Command and General Staff College. He is a member of the American Society for Metals, the Institute of Mining and Metallurgical Engineers, American Chemical Society, and the American Ordnance Association.

Lt Col L. G. Klinker

# U.S. Army Electronics Command Announces Major Staff Assignments

Col Harold W. Rice

Vincent J. Kublin

Dr. E. A. Gerber

Jacob J. Greenman

Appointments to seven major positions in the newly restructured U.S. Army Electronics Command at Fort Monmouth, N.J., have been announced by Maj Gen Frank W. Moorman, commanding general.

COL HAROLD W. RICE took over as Chief of Staff of the E-Command, replacing Col Gerald P. Lerner who was reassigned to Fort Belvoir, Va., as project manager of the Army's Command Control Information System (CCIS–70s) program. He also will continue to serve as chief of the E-Command's Commodity Management Office for Avionics and Navigation Aids.

Col Rice graduated from the U.S. Military Academy in 1942 and has since, concurrent with regular duty or between other assignments, obtained a master of business administration degree from Harvard Business School.

He has done postgraduate work in business administration at Goethe University in Germany, George Washington University, and is a graduate of the U.S. Aviation School, the Industrial College of the Armed Forces, the Command and General Staff College and the Signal School.

From 1954 to 1957 he was commanding officer of the U.S. Army Signal Procurement Center in Europe and, after assignment with the Deputy Chief of Staff for Logistics, served from 1959 to 1962 as military assistant to the Secretary of the Army, providing technical assistance and guidance on Army logistics, budgets, and Congressional affairs.

JACOB J. GREENMAN was designated special assistant to the commanding general for audits, and John W. Weseloh took over as director of the Quality Management Office. The positions, both in newly created elements, have a direct bearing on further improving operations within the Command and among industrial suppliers.

Under the former Command organization, Greenman was technical director of the Procurement and Production activity. As special assistant for audits, his job encompasses responsibility for surveys of industry management, and external and internal audits of Command procedures.

The Quality Management Office, which is an E-Command headquarters element, works with the operating elements and other Command activities to assure that electronics equipment meets the highest standards of performance and reliability, is designed for simple maintenance and operation, and is devoid of costly nonessential "frills."

JOHN W. WESELOH was graduated with honors from the University of Wisconsin with a B.S. degree in electrical engineering, and has done graduate work at Purdue and Rutgers Universities. He was an engineer with a major midwestern radio station before entering Government service as an engineer in 1942. He served in World War II and left active service as a captain.

Appointments to major positions in the Electronics Components Department of the Electronics Labs include Dr. Edward A. Gerber as director and S. F. Danko, assistant director.

Vincent J. Kublin was named director of the department's Solid State and Frequency Control Division and Milton Tenzer became director of the Electronics Parts and Materials Div.

DR. GERBER succeeds W. L. Doxey, who was recently named as technical director of the Laboratories. Formerly director of the Solid State and Frequency Control Division, he was educated at the Institute of Technology in Munich and Berlin, and has been employed at the Laboratories since he came to this country from Germany in 1947.

He is a Fellow of the Institute of Electrical and Electronics Engineers, and a member of the American Physical Society and the International Scientific Union.

Born in New York, S. F. DANKO has been with the Government since 1940 and the Laboratories since 1946. He has a B.S. degree from Cooper Union Institute of Technology and has done graduate work at the University of Pennsylvania and Rutgers University.

He is known as one of the principals in the establishment of the dip-soldered printed wiring process known as

S. F. Danko

Milton Tenzer

John W. Wesoloh

Auto-Sembly which has been an important factor in the successive reductions in the size and weight of electronic parts and equipment. In 1957, he shared a $10,000 Department of the Army award for his contributions in this field. He holds a Meritorious Civilian Service Award, and shares a patent on the dip-solder technique.

VINCENT J. KUBLIN received a B.S. degree in electrical engineering from the College of the City of New York in 1942 and has taken graduate courses in management and advanced electronics technical areas. Employed by the Laboratories since 1942, he received the Department of the Army Sustained Superior Performance Award for research and development in April 1955.

MILTON TENZER has been associated with research and development on electronic parts and materials at the Laboratories for the past 16 years. His specialty is all types of wire and cable and microwave transmission line devices.

A 1940 graduate of Cooper Union, he has done graduate work at Rutgers and Polytechnic Institute of Brooklyn, and is currently a lecturer at Monmouth College.

# ARIEM Psychologist to Attend ICAF Course

A psychologist with the Army Research Institute of Environmental Medicine (ARIEM), at the U.S. Army Natick (Mass.) Laboratories, has been selected to attend the 1964–65 resident course at the Industrial College of the Armed Forces, Washington, D.C.

Dr. E. Ralph Dusek, currently scientific adviser on military performance for ARIEM, will join a small group of key civilian Federal career personnel who will study various developmental programs.

Dr. E. Ralph Dusek

The 10-month ICAF course is designed to provide a background knowledge in the major policies, programs, organizations, and problems relating to the national security, with emphasis on their economic and industrial aspects. Topics are discussed against a setting of worldwide conditions.

Dr. Dusek, a native of San Angelo, Tex., attended John Tarleton Agricultural College, Stephenville, Tex., the University of Texas at Austin, and University of Oregon. He received his B.A. in psychology from the University of Missouri, graduating with honors, and gained M.A. and Ph.D. degrees in experimental psychology from the State University of Iowa. He subsequently became an assistant professor at the University of Arkansas.

Previous to being assigned to his present post with ARIEM, he was head of the Psychology Laboratories in the Pioneering Research Division at the Natick Laboratories. He now directs research to determine how climate affects the soldier's life processes, his performance and his health. He is the author or coauthor of several papers and technical reports on the behavior of the soldier and the performance of his equipment and supplies under the stress of weather extremes.

Dr. Dusek is a member of the American Psychological Association; Psychonomic Society; American Association for Advancement of Science; the American Academy of Political and Social Sciences; Natick Laboratories Chapter, Research Society of America; and a Fellow, Military Psychology Division, APA.

## Springfield Armory Cites Veteran Female Engineer

Thirty years of continuous service at Springfield (Mass.) Armory is the proud record of Miss Mary E. Bransfield, one of many women whose scientific and engineering talents are contributing notably to the success of the Army research and development program.

Recipient of a 30-year Federal service award at a recent ceremony, Miss Bransfield has acquired an extensive background in subjects relating to her professional field, qualifying her for her assignment as a project engineer for post-standardization engineering of specific weapons. Her duties include supervision of male engineers and draftsmen.

Responsibilities assigned to her include design studies on weapons; evaluation of requests for deviation and for technical action, originated by manufacturers and involving design, dimensions, tolerances and materials; and monitoring of contracts for engineering services.

Miss Bransfield gained professional training in mechanical design and civil engineering at the Massachusetts Institute of Technology and at Harvard University (evening classes). Extension courses in electrical, mechanical and civil engineering at Massachusetts University and at American International College culminated in a B.A. degree. She also completed courses in physics and electronics.

A member of Alpha Chi national honor society, she was employed previous to her Springfield Armory assignment at the Hixon Electric Co., South Braintree, Mass., the Bureau of Architects and Engineers, Boston, Mass. and the City of Boston Assessing Department. Her responsibilities have always been in the drafting and engineering fields.

Mary E. Bransfield

### Test Facilities Chief Promoted

Chief of the Field Test Facilities Department at Fort Huachuca, Ariz., George H. Darwin, was promoted to full colonel at a June 17 ceremony conducted by Maj Gen Benjamin H. Pochyla, USAEPG commander.

Col Darwin has been with FTFD since 1961 and was Electromagnetic Environment Branch chief before becoming head of the Department.

At 45, he has over 29 years military service, beginning with the Minnesota National Guard (34th Infantry Division) in 1935. Among his decorations is the French Medal Militere (the French equivalent to the Distinguished Service Medal), awarded for action in the N. African Campaign of WW II.

Dr. W. McClelland | Dr. E. A. Cogan | Dr. C. J. Lange | Dr. J. E. Taylor | Dr. H. H. McFann

# HumRRO Effects 7 Key Personnel Shifts; McClellan Becomes Associate Director

Reorganization involving key personnel changes is in progress at the Human Resources Research Office (HumRRO), George Washington University, at central offices in Alexandria, Va.

DR. W. A. McCLELLAND, currently deputy director for General Operations and Personnel, will become associate director of HumRRO. His old position will be discontinued. As second-in-command to Dr. Crawford, he will be senior adviser on policy formulation and personnel matters and will coordinate all HumRRO activities.

In 1955 he joined HumRRO as director of research, Training Methods Division, and held that post until 1960. An Army Air Force psychologist during World War II, he received his Ph. D. degree from the University of Minnesota, where he also served on the faculty. He was also assistant professor of psychology and assistant to the dean at Brown University and a supervisory research psychologist for the U.S. Air Force before coming with HumRRO.

DR. HOWARD H. McFANN, who became deputy director for Program Development two years ago, is returning to the Presidio of Monterey, Calif., where he will become director of research of the Training Center Human Research Unit (HRU), a post he held from 1958 to 1962. His present position will be discontinued.

Dr. T. O. Jacobs | Dr. W. L. Williams

Dr. McFann was also director of research of the Armor HRU at Fort Knox from 1956 to 1958 and was one of the original members of the Infantry HRU at Fort Benning. His experience in HumRRO dates back to 1952 when he joined the Motivation, Morale, and Leadership Division after receiving his Ph. D. degree from the State University of Iowa.

DR. JOHN E. TAYLOR, currently director of research at the Training Center HRU, will transfer to Alexandria in July to become assistant director for Operations. He also will be responsible for the dissemination of research information.

In 1954, after receiving the Ph. D. degree from the State University of Iowa, Dr. Taylor joined the staff of the Infantry HRU where, at various times, he served as task leader of TRAINFIRE, MOONLIGHT, and RIFLEMAN. He transferred to the Leadership HRU in 1959, becoming director of research in 1962. It was during this period that the Presidio unit received its new mission as the Training Center HRU.

DR. CARL J. LANGE, director of research at the Infantry HRU since 1960, will become the new assistant director for planning. He will be responsible for formulating HumRRO's annual work program and for long-range planning as well as for reviewing task and subtask planning papers.

Dr. Lange holds the Ph. D. degree from the University of Pittsburgh. From 1953 to 1959, he served with the Leadership HRU and since then with the Infantry HRU. He was task leader of OFFTRAIN, which developed the program of leadership instruction now taught in all senior college ROTC units in the country.

DR. T. OWEN JACOBS has been named to succeed Dr. Lange as director of research at the Infantry HRU. Presently deputy director of research of that Unit, he has been on the HumRRO staff since 1957. He earned a Ph. D. degree from the University of Pittsburgh and has worked productively in the fields of military leadership and group performance.

DR. EUGENE A. COGAN, now adviser for psychostatistical methods, has been named assistant director for reporting, in which he will supervise all HumRRO technical reporting activities. He will also continue to provide research advice to the several HumRRO divisions and field laboratories at their request.

One of the original members of the Motivation, Morale, and Leadership Division, Dr. Cogan has also served on the research staff at the Armor HRU. He holds a Ph. D. degree from U.C.L.A. and has been a member of the Director's Office staff since 1960. His present post is being abolished.

A fourth assistant director, yet to be named, will be responsible for supporting and furthering Army implementation of HumRRO research and development products, for providing consulting services, and for initiating a new historical and review function.

DR. W. L. WILLIAMS, Jr., executive officer since 1962 and a HumRRO research scientist since 1955, has resigned to accept the newly created position of director of educational research, Medical College of Georgia, Augusta, Ga., with a part-time teaching appointment in the Department of Psychology at Athens, effective in September. He has a Ph. D. degree from the University of Tennessee and served previously with the Air Defense HRU at Fort Bliss, Tex., and as the HumRRO director's representative at Headquarters, USCONARC.

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*PIGS.* My father once told me: "Son, never wrestle with pigs. You get dirty and they enjoy it." This is an earthy phraseology of an old Chinese proverb: In shallow waters, shrimps make fools of dragons.

# DoD Instruction Prescribes Uniform Policies for Technical Data

Department of Defense Instruction 5010.12, issuance of which was announced June 3, prescribes uniform policies and procedures for procurement of technical data and information throughout the Military Services.

Announced jointly by Assistant Secretary of Defense (Installations and Logistics) Thomas D. Morris and Assistant Secretary of Defense Dr. Eugene G. Fubini, Deputy Director of Defense Research and Engineering, the Instruction provides guidelines for determination of requirements for data and information to be procured from contractors.

Estimates of the cost of technical information requirements within the Defense Department, difficult to fix accurately, have ranged as high as $2 billion annually.

Technical data and information are the means for communication of plans, concepts, requirements and instructions relating to technical projects, material, systems and services. These may include specifications, standards, engineering drawings, associated lists, manuals and reports, including scientific and technical reports.

The Instruction provides the Military Departments, Defense Supply Agency and other DoD components with uniform policies for determining intended use of the data and the establishment of data requirements based on their use; for exercising selectivity to prevent acquisition of unnecessary and excessive data; for determining data costs and justifying data requirements; for assuring timely delivery of quality and quantity required; for applying management techniques in data acquisition programs; for establishing centralized data management policy offices at Departmental and DSA headquarters level; and for conducting technical data reviews on selected contracts each year.

DoD objectives in acquiring technical data and information are spelled out by the Instruction as:

- To acquire most economically the minimum amount of data needed to procure and support military systems, materiel and services.
- To assure the acquisition of required data on time to serve its intended purpose.
- To establish data requirements on the basis of needs in management engineering and logistics functions of the DoD; and to fulfill these needs on the basis of cost-effectiveness analyses.
- To specify data requirements in solicitations for bids or proposals in sufficient detail to provide a basis for a full, clear and firm understanding between the Government and the contractor with respect to the total data requirements at the time the contract is placed. This requirement may be satisfied by a contractual provision for the right to defer the selection, ordering or delivery of technical data specified in the contract.
- To provide competent administration of contracts requiring the furnishing of technical data and information, and assure that all contract provisions pertaining to data are fully satisfied.
- To maintain quality assurance procedures in the acquisition of technical data to assure the adequacy of the data for its intended purpose.
- To provide for the continued currency of acquired data in consonance with requirements.
- To prevent the acquisition of duplicate or overlapping data pertaining to material, systems or services when data which would serve the same end use has been or is being acquired by the Government from the same or other contractor.

The Instruction calls for immediate implementation by the Military Departments, DSA and other applicable DoD components.

# New Computer at USAEPG Reduces Operating Costs

A machine capable of solving a mathematical problem in five seconds that would take an estimated 15 years for a man with pencil and paper to complete is now being installed at Fort Huachuca, Ariz.

Maj Gen Benjamin H. Pochyla, USAEPG commander, said installation of the IBM 7090 computer system will be completed for operation about July 1. It will cut operating costs by $30,000 per month and reduce processing time by nearly one-half for the many test and evaluation tasks now underway. The 7090 replaces the 709 computer system and is capable of doing the same amount of work in one-fourth the time.

Officials in the Field Test Facilities Department (FTFD) of USAEPG said that with the 709 system it was necessary to operate three 8-hour shifts seven days a week to meet data reduction requirements. The 7090 will perform the same tasks in a 10-hour, 5-day week.

The manpower reduction is expected to relieve a great deal of pressure on the military of USAEPG. All operators in the data processing center are Army personnel .

More than 32,000 items can be stored in the machine's "memory core." More storage is available with the application of additional facilities, integral with the new computer.

Among additional capabilities, the 7090 can read and write up to 60,000 characters per second from improved tape-drive units which have a capacity up to 800 characters per inch.

**FORMER DIRECTOR OF ARMY RESEARCH Maj Gen Chester W. Clark, who departed to take command of the U.S. Army, Japan in August 1963, still finds time to be an ardent spokesman for the Army R&D program at many gatherings of leading U.S. and Japanese Army, as well as U.S. State Department and Japanese government, officials. Here he is shown at a reception at Camp Zama, Japan, honoring General Kan Ohmori, chief of staff, Ground Staff Office, Japan Defense Agency. The 4-star Japanese general visited military facilities at Redstone Arsenal, Ala., June 1–2, then returned to Japan to inspect the earthquake-battered city of Niigata. As you may have deduced, the ladies are their wives.**

# FBA Honors Dr. Zahl for Public Service

Dr. Harold A. Zahl, director of Research at the U.S. Army Electronics Laboratories, Army Electronics Command, Fort Monmouth, N.J., was cited recently by the Federal Business Association (FBA) of New York for outstanding public service.

The well-known scientist, who joined the Laboratories shortly after receiving his Ph. D. in physics in 1931 from the State University of Iowa, was acclaimed for a "career . . . marked by sustained and continuing competence, ability, interest, performance, and devotion in the cause of his Government and the general public."

Col James M. Kimbrough, Jr., Laboratories director, presented a plaque inscribed with the citation during a luncheon held by the FBA at the U.S. Naval Air Station, Floyd Bennett Field, Brooklyn. The award was signed by Thomas E. Scanlon, president of the FBA of New York and district director, Internal Revenue Service for Brooklyn and Long Island.

Membership in the FBA–NY is drawn from executives and assistants who work in various branches of Federal service in the New York and New Jersey metropolitan area. The association presents the "Outstanding" award annually to one civilian and one military person selected from numerous nominees.

The military service award for 1964 was presented to Comdr James P. Marron of the Third Naval District, who was honored along with Dr. Zahl at the luncheon.

Dr. Zahl is credited with pioneering work in acoustics, infrared detection and radar. After a competitive demonstration in 1936 proved the superiority of his equipment, the Signal Corps was given complete Army development responsibility for electromagnetic detection of ground, sea and air targets. This event had a large bearing on accelerating the development of radio-wave reflection techniques for aircraft detection.

Subsequently he conceived and patented a pneumatic cell detector which was a major component in the Army's first radar set, the SCR–268–T1, successfully demonstrated in 1938.

A year before the U.S. entered World War II, he invented the GA–4 Transmitter-Receiver Tube, which made single-antenna systems possible for Army and Air Corps early-warning radars. He also contributed many engineering features to a number of early-warning radar sets.

When he entered military service as a major in the Signal Corps in 1942, the frequency ceiling of radar was 200 megacycles, which limited efforts to reduce the size of bulky equipment. Dr. Zahl was asked, hopefully, to create the highest frequency device that would permit sharp reductions in radar size without loss in range and resolution.

The result was the VT–108, better known as the Zahl tube, a significant breakthrough in electronics. Within a short time, 250,000 watts of peak power at 600 megacycles were available to the equipment designer.

Meantime, Dr. Zahl had been given responsibility not only for direction of research and development in all radar tubes for Army ground forces and the Air Corps, but also for tube procurement amounting to $200 million. The Army presented him the Legion of Merit before he left active duty as a lieutenant colonel in mid-1946.

After the war, he urged, with a large measure of success, that the scientific programs that had been built up with the support of universities and industry be continued, along channels adapted to the times.

In 1948, he became the first Army scientist promoted under Public Law 313 solely as the result of accomplishments during a Civil Service career. He has been among scientists who recognized from the outset the potential of such developments as the maser, laser, Atomichron (atomic clock), and satellites for such practical uses as communications and meteorology.

In 1962, he was presented the Exception Civilian Service Award, the highest honor the Department of the Army confers on its civilian employees. He is a Fellow of the American Physical Society; a member and former board member of the Armed Forces Communications and Electronics Association; a Fellow and former board member of the Institute of Electronic and Electrical Engineers, and was given the IEEE Harry Diamond Memorial Award in 1954.

Dr. Harold A. Zahl

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*TWICE TWO.* Talking about centralization, Hermann Hess, *Das Glasperlenspiel,* referred to the reply of a university professor in the *Republic of Massagetes:* "The sum total of twice two is not for the Faculty to determine but for his Highness the General!"

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**DIPLOMATES of American Board of Microbiology from the U.S. Army Biological Laboratories at Fort Detrick, Md., number six with the recent addition of two members. L. to R. are Maj Robert W. McKinney, U.S. Army Medical Unit, certified in Public Health and Medical Laboratory Virology (PH&MLV); Dr. Arthur N. Gorelick, chief, Virus and Rickettsia Division, PH&ML Microbiology (M); Dr. Henry T. Eigelsbach, chief, Bacteriology Branch, Medical Bacteriology Division, PH&ML Bacteriology (B); Dr. Dorothy G. Smith, assistant director, Biological Research, PH&MLV; Dr. Leionard A. Mika, Program Coordination Office, PH&MLV; and Dr. Riley D. Housewright, scientific director, PH&MLM. Dr. Eigelsbach and Maj McKinney are the most recent additions to the list.**

# Army Research Office Scientist Wins MCS Award

The U.S. Army Meritorious Civilian Service award recently was presented to Dr. Hoyt Lemons, chief, Geophysical Sciences Branch, Environmental Sciences Division, U.S. Army Research Office.

Lt Gen William W. Dick, Chief of Research and Development, presented the award and a citation which stated that during the period from Sept. 1, 1962 through Aug. 31, 1963, Dr. Lemons distinguished himself by "achievements in the comprehensive and imaginative guidance of the broad research and development programs in the geophysical sciences for the ultimate benefit of the field army. . . ."

Dr Lemons has been responsible for analysis and improvement of U.S. Army programs in geophysical sciences research and development and for providing Department of the Army agencies with expert scientific advice and guidance.

He represents his office at high-level Government, military and civilian scientific meetings and symposia. The National Academy of Sciences appointed him a delegate to the 11th General Assembly—20th International Congress, International Geographical Union, meting this month in London, England.

Dr. Lemons has been instrumental in the initiation and implementation of the high-altitude research project (HARP), which is sponsored jointly by the U.S. Army and McGill University of Canada. The project portends a significant breakthrough in the methods of conducting high-altitude soundings for military and scientific purposes.

Listed in *American Men of Science* and the *Directory of American Scholars*, Dr. Lemons has served as a council member of the Association of American Geographers and is author of more than 30 technical articles. He presently holds the title of professor of climatology at the University of Maryland, where he teaches on a part-time basis.

**Lt Gen William W. Dick, U.S. Army Chief of Research and Development, congratulates Dr. Hoyt Lemons, chief geophysical scientist at USARO, while presenting him with the Army Meritorious Civilian Service Award.**

## Radar Symposium Attended By Over 500 at Ft. Monmouth

The 10th annual Radar Symposium, conducted by Project Michigan in cooperation with the U.S. Army, Navy and Air Force, was held recently at the U.S. Army Electronics Laboratories, Fort Monmouth, N.J.

More than 500 representatives from the Armed Forces, industry, and universities attended the 3-day meeting. About 20 papers were presented on new findings in the field of radar, particularly its use for combat surveillance.

Project Michigan, which is conducted for the Army by the University of Michigan at Ann Arbor, is a continuing research program devoted to combat surveillance.

Conferees were welcomed by Col Robert K. Saxe, acting deputy director of the Laboratories. Brig Gen J. Wilson Johnston, commanding the U.S. Army Satellite Communications Agency (SATCOM), Fort Monmouth, spoke on satellite communications at the symposium banquet.

## Missile Command Staff Chief Transferred to Audit Agency

Col Henry J. Katz, the U.S. Army Missile Command's chief of staff at Redstone Arsenal, Ala., departs this month for a new assignment as deputy chief of the Army Audit Agency for its 11-state Western area.

A 1936 U.S. Military Academy graduate, Col Katz first went to Redstone in August 1961 as deputy commander, Army Missile Support Command. One year later he transferred to the Missile Command as deputy chief of staff.

Former assignments include duty at the Hawaiian Ordnance Depot, at the U.S. Military Academy as instructor and assistant professor of Mathematics, at Detroit's Ordnance Tank Automotive Center, and Office, Chief of Ordnance in Washington. He commanded the 59th Ordnance Group in Korea and the Ordnance Industrial Center in Europe.

# Contractors Show Aircraft at 4th Army Aviation Meet

Top level U.S. Army aviation officials and 44 representatives of 19 industrial firms joined over 150 military pilots for the Fourth Army Aviation Conference, June 9–11, at Fort Sill, Okla.

Keynote speaker was Brig Gen John J. Tolson, III, director of Army Aviation, a much-decorated combat veteran and a 1937 graduate from the Military Academy at West Point, N.Y.

During World War II, he participated in the recapture of Corregidor Island and made every combat jump of the 503rd Parachute Infantry Regiment. Formerly he was assistant commandant of the Army Aviation School and director of the Airborne-Army Aviation department of the Infantry School at Fort Benning, Ga.

**Brig Gen John J. Tolson**

Featured was a joint Army-industry display which clarified the U.S. Army's broad capability in air mobility and indicated the many firms involved in the military aviation program development.

Companies displaying products included Lockheed-Georgia, builder of the Army's SV–4A Hummingbird; Continental Aviation and Engineering Corp., manufacturer of the T–65 gas turbine and reciprocating engines; Vertol Division of Boeing Aircraft Co., producer of the Army's standard medium helicopter, the CH–47A Chinook;

General Electric, whose GE lift fan is used in the SV–5A; Allison Division of General Motors Corp., whose T–64 gas turbine engine powers the helicopters competing for selection as the Army's light observation helicopter (LOH); Bell Helicopter Co., builder of the UH–18 helicopter; de-Havilland Aircraft of Canada Ltd.; and Piasecki Aircraft Co., builder of the "Flying Jeep."

Other firms represented were Curtis Wright, Dynalectron Corp., Economics Lab, Inc., Hughes Tool Co. and these aircraft corporations: Hiller, Kaman, Hughes, Sikorsky, Lockheed, and Douglas.

# Army Contracts Exceed $172 Million

U.S. Army research, development and production contracts in recent weeks, totaling over $172,840,000, were topped by a $27,500,000 award to the Martin Co. of Orlando, Fla., for production of Pershing missile ground support equipment.

An additional $2,873,885 award was made to the Martin Co. for industrial engineering services in support of the Pershing weapons system. Pershing, a 2-stage, solid-propellant missile which is now operational, is project managed by the Army Missile Command, Redstone Arsenal, Ala.

American Hoist and Derrick Co., St. Paul, Minn., will produce 360 20-ton wheel-mounted cranes for $16,078,837. Western Electric Co., New York City, received three contracts totaling $16,084,593 for work on the Nike Hercules missile system. Sylvania Electric Products, Inc., Needham, Mass., was awarded $12,000,000 for classified electronics equipment.

International Harvester Co., Chicago, Ill., will receive $6,457,687 for 140 heavy equipment transporters. S and S Constructors, Inc., Lancaster, Calif., will get $6,225,943 for construction of a hi-thrust rocket engine complex.

For $5,830,223 the Sperry Rand Corp., Salt Lake City, Utah, will produce seven launching stations, seven organizational maintenance test stations and three field maintenance test stations, all for the Sergeant missile.

The Bendix Corp., Teterboro, N.J., received a $5,394,480 contract for 56 simulator stations for training Nike Hercules system operators. Firestone Tire and Rubber Co., Akron, Ohio, was awarded $4,437,677 for 174,088 track shoe assemblies for tanks and $1,276,912 for 1,353,125 track shoe pad replacement parts for the T–130 personnel carrier.

Hol-Gar Manufacturing Co., Clifton Heights, Pa., will produce 6,639 generator sets for $3,721,486. Southern Airways of Texas, Inc., Mineral Wells, Tex., was awarded a $3,666,285 contract for flight training of helicopter pilots and maintenance of aircraft and equipment.

The Chrysler Corp. of Detroit, Mich., received two contracts totaling $5,027,397 for production engineering services for the M60A1 tank, armored vehicle launch bridge chassis and for 308 ¾-ton trucks.

Continental Motors Corp., Muskegon, Mich., was granted $3,040,414 for 167 engine assemblies for use on tanks, gun-carriers and flamethrowers. The General Time Corp., La Salle, Ind., was awarded a $2,800,420 contract for fuze and firing pin assemblies for bombs.

Sylvania Electric Products, Inc., Waltham, Mass., was granted $2,768,000 for the design, fabrication, installation and test of an interferometer system radar for use in Project Defender. Northrop Corp., Needham Heights, Mass., bid successfully at $2,692,849 for helicopter armament subsystems, final inspection equipment and special tooling.

Other contracts were: FMC Inc., San Jose, Calif., $2,471,093 for 214,117 track shoes for M11, M106 and M577 personnel carrier vehicles; Johnson Furnace Co., Bellevue, Ohio, $2,423,117 for 2,921 cargo trailers; Icanda Ltd., Montreal, Canada, $2,374,086 for construction of an upstream cutoff wall at the Allegheny Dam and Reservoir Project;

Olin Mathieson Chemical Corp., East Alton, Ill., $2,297,495 for production of 56,602,500 brass case 45. caliber cartridges; Allison Steel Manufacturing Co., Phoenix, Ariz., $2,264,400 for 90 armored vehicle launch bridges; International Business Machines Corp., Washington, D.C., $2,134,100 for configurations of various types of automatic data processing equipment; Motorola, Inc., Scottsdale, Ariz., $2,110,726 for engineering changes to modify five data transfer systems for OV-1B Mohawk aircraft.

Lesser contracts were: North American Aviation, Inc., Columbus, Ohio, $1,900,000 for production of target missiles, ground support and test equipment and engineering services for the Roadrunner Target Missile System; Standard Products Co., Cleveland, Ohio, $1,891,232 for the manufacture of 163,162 T-130 track shoes for M113 personnel carriers; Honeywell, Inc., Hopkins, Minn., $1,820,644 for 1,640,220 metal fuzes, less booster; Collins Radio Co., Dallas, Tex., $1,740,013 for military integrated communications systems;

General Electric Co., Utica, N.Y., $1,700,000 for work on classified electronics equipment; Firestone Tire and Rubber Co., Akron, Ohio, $1,547,952 for 2,400 metal parts for bomb dispensers and products containers; International Business Machines Corp., $1,534,115 for automatic data processing equipment; the University of Colorado, Boulder, Colo., $1,350,000 for research in astrophysics; Bendix Corp., Baltimore, Md., $1,293,069 for 544 receiver-transmitters;

Continental Aviation and Engineering Corp., Detroit, Mich., $1,245,500 for design analysis and experimental testing of an advanced turbine for small gas turbine engines; Maxwell Electronics Corp., Garland, Tex., $1,206,162 for 2,181 receivers-transmitters RT–77/GRC–9; Consolidated Welding and Engineering Co., Chicago, Ill., $1,196,350 for 60 launchers, bridge, M60 series tank chassis; Capital Engineering Manufacturing Co., Chicago, Ill., $1,196,350 for 60 launchers (M60) to be used for the transporting and laying of aluminum bridges;

Radio Corp. of America, Moorestown, N.J., $1,178,000 for the Tradex data recovery system utilizing tape recorders; Curtis-Wright Corp., Woodbridge, N.J., $1,160,500 for design analysis and experimental testing of an advanced turbine for small gas turbine engines and the furnishing of reports and data results; Melpar, Inc., Falls Church, Va., $1,137,500 for research work which will result in the fabrication of one exploratory development model of a "Multi-mode Propagation Communication System";

Kaiser Jeep Corp., South Bend, Ind., $1,069,800 for production of 60 5-ton vehicles with multifuel engines; Kaminer Construction Co., Chamblee, Ga., $1,069,178 for construction of an acoustic model test facility at the Marshall Space Flight Center, Huntsville, Ala.; Hughes Aircraft Co., Fullerton, Calif., $1,058,127 for the design and fabrication of a system improvements modification kit for the AN/FSQ–38 Air Defense System.

## Initial Class Begins Study In DoD Information School

The first class of students from the Army, Navy, Air Force and Marines began classes this month at the newly established Defense Information School at Fort Slocum, N.Y.

In replacing the Army Information School at Fort Slocum, the new facility also phases out the Naval journalists' school. The consolidation is expected to "promote economy and efficiency by eliminating administrative overhead" and fostering "effectiveness by insuring common standards," the DoD directive establishing the school stated.

The Department of the Army will conduct the school under policy guidance of the Assistant Secretaries of Defense for Manpower and Public Affairs, with about 1,000 students attending classes annually.

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**What most people are looking for these days is less to do, more time to do it in, and more pay for not getting it done—the new quest for Utopia!**

# CDC Names Hardison Scientific Adviser

The U.S. Army Combat Developments Command has indicated its growing interest in research and development activities by assigning David C. Hardison as scientific adviser, responsible directly to Lt Gen Dwight Beach, commanding general.

Until he assumed his new duties in time for the CDC's second anniversary on June 20, Hardison was a weapons system expert at the U.S. Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md. He joined the BRL staff immediately after obtaining a master's degree in mathematics (Duke University 1952).

Known for his work on armor weapons systems, munitions performance, and tank and antitank weapons, he served as technical member, delegate and later head of the delegation to the U.S. and Tripartitite Armor Policy, Tank Target, and Tank Philosophy Conferences.

Hardison is recognized for originating the methods of predicting accuracy of direct fire weapons adopted as standard by the U.S. Tripartite and NATO countries. He was responsible for the plan of test, data analysis, and effectiveness study resulting in recommendations for the armament system adopted for the U.S. M-60 tank.

In the antitank field, Hardison originated the idea and specified preliminary design for the TOW (tube-launched, optically tracked, wire-linked) missile system and for the Shillelagh system now being developed for the air-droppable General Sheridan light tank.

In his new position, he will conduct theoretical investigations of potential importance to the commanding general's mission of creating or evaluating the conceptual ideas which form the basis for the Army's future tactics, organization and materiel.

He will relate future state-of-the-art with anticipated capabilities of industry and the requirements of the Army 10-20 years in the future. Also, he will maintain close contact between the scientific and engineering community and the USACDC headquarters, seven subordinate headquarters and 20 agencies throughout the country.

His years of operations research and analysis experience will be vital to the Command's task of doing the Army's advanced "consumer research" while new tactics, organization and materiel are in the idea stage.

Lt Gen Dwight E. Beach, CG, USACDC, welcomes David C. Hardison to headquarters as scientific adviser.

# USATECOM Assigns Richter as Electronics Test Director

Lt Col Francis A. Richter, 39, has been named as director of Electronics Testing, U.S. Army Test and Evaluation Command (USATECOM) Headquarters at Aberdeen Proving Ground.

Col Irving R. Obenchain, Jr., his predecessor, member of the original 8-man test directorate team, was selected as the director for Electronics Testing when USATECOM was organized in August 1962.

A 1942 graduate of the U.S. Military Academy with an M.S. degree in electrical engineering from the Massachusetts Institute of Technology (1951), Col Obenchain has been assigned to duty with the U.S. Army Signal Brigade in Europe.

Lt Col Richter joined USATECOM after a tour of duty with the U.S. Continental Army Command, Fort Monroe, Va. A 1956 Military Academy graduate, he later earned an M.S. degree in electrical engineering from Georgia Institute of Technology.

His duties as director of Electronics Testing at USATECOM, under the command of Maj Gen James W. Sutherland, Jr., include responsibility for planning, executing and reporting the test programs of Army communications - electronic systems and equipment.

The Electronic Testing Directorate is one of eight USATECOM directorates responsible for testing all Army materiel. The others work in the fields of armor, field artillery, aviation, air defense, general equipment, infantry and nuclear-biological-chemical weapons.


Lt Col Francis A. Richter


Col Irving R. Obenchain, Jr.

## Female Ph. D. Wears 2 Hats On Surgeon General's Staff

Lt Gen Leonard D. Heaton, The Army Surgeon General, has appointed Lt Col Mary Lipscomb as assistant chief of the Army Medical Specialist Corps and chief of the Dietetic Section.

She will take office during July when Lt Col Katherine E. Manchester completes her 4-year tour at The Army Surgeon General's Office.

A native of South Carolina, Col Lipscomb has been on active duty in the Army Medical Corps since 1943. She holds a B.S. in home economics from Winthrop College, Rock Hill, S.C., a master's degree in institute management from Iowa State College, Ames, Iowa, and a Ph. D. in food administration from the University of Wisconsin.

During World War II, she was a dietitian on a hospital ship and in Tokyo during the Korean conflict. She also has served at Valley Forge and Fitzsimons General Hospitals, and as director of the Dietetic Intern Program at Brooke Army Medical Center. She holds the Army Commendation Medal with Oak Leaf Cluster for outstanding military service.

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**If you want to do something for the lady with strings on your heart, buy her a bikini bathing suit, it's the least you can do for her!**

# 300 Operations Re

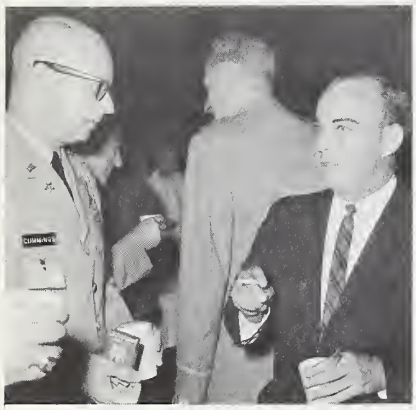
Maj Hugo da Gama-Rosa Sucupira, Brazilian Army, checks in at Army's Operations Research Symposium.

*Special warfare and Army costs formed the two main subjects discussed at the recent Operations Research Symposium at the U.S. Army Weapons Command, Rock Island (Ill.) Arsenal. Representatives of the Secretary of Defense, top Army echelons, various Army installations, industry and universities comprised the 300 attendees.*

*An international panel that included military commanders from the British and Australian forces discussed special warfare and contended that operations research can be applied to counterinsurgency. The moderator was Maj Gen William P. Yarborough, commander of the U.S. Army Special Warfare Center, assisted by Dr. Hugh M. Cole, Research Analysis Corp.*

*Symposium proceedings and an executive summary are being prepared for issuance early in September.*

AMONG ARMY REPRESENTATIVES (left t search office (ARO), Durham, N.C.; Col Cha Gen Walter E. Lotz, Jr., Director of Army Army Weapons Command; and (back to came Systems, U.S. Army Missile Command.



Maj. W. J. Cummings, OCRD, and Dr. B. Payne, assistant to Secretary of the Army (Operations Research).

Col John E. Beebe, U.S. Army Special Warfare School, chats with Jack Raymond, Washington Bureau, N.Y. Times.

DEFENSE RESEARCH OFFICE in Rio de Janeiro, Brazil, was represented by Col L. M. Orman, Commanding officer, who chats with Lazarus H. Todd, Office, DCS/Logistics.

Dr. George E. Nicholson, Jr., University of North Carolina, general chairman of the symposium, left, and Dr. William A. Niskanen, Jr., director, Special Studies, Office of Assistant Secretary, Comptroller.

Maj Gen H. T. Alexander, Chief of Staff, Headquarters, Northern Command, York, Yorkshire, United Kingdom, and a member of the panel on Special Warfare, participates in panel discussion during symposium.

INTERNATIONAL PANEL ON SPECIAL WARFARE (l. to r.) Dr. Rex Hopper, Brooklyn College; Col S. C. Graham, commandant, Jungle Training Center, Army Hq. Canberra, Australia; Dr. Reuben Nathan, Fairfield Institute; Maj Gen Washington Bureau, New York Times; Maj Gen H. T. Alexander, Chief of Staff, Headquarters, Northern Command; R. G. K. Thompson, British Embassy, Saigon; and Dr. Hugh Cole, Research Analysis Corporation.

# arch Experts Confer

ght) Col Nils M. Bengtson, CO, U.S. Army Re-
B. Hazeltine, Jr., ARO, Washington, D.C.; Brig
arch; Brig Gen Roland B. Anderson, CG, U.S.
Brig Gen C. W. Eifler, Deputy CG, Land Combat

Brig Gen Roland B. Anderson, Commanding General of the U.S. Army Weapons Command (AWC), talks with Oscar M. Wells, AWC chairman of the Symposium Planning Committee.

Dr. Alexander M. Mood, president, Operations Research Society of America, speaks on War Gaming.

Maj Gen William E. Bunker, Deputy CG, U.S. Army Materiel Command, presides at symposium luncheon.

Col S. C. Graham, commandant, Jungle Training Center, Army Hq, Canberra, Australia, and a member of panel on Special Warfare, delivers speech.

Dr. Robert M. Thrall, professor of mathematics and operations research, University of Michigan, prepares critique of entire 3-day symposium.


ARMY OPERATIONS RESEARCH SYMPOSIUM participants gather in front of Centennial Hall, Augustana College, Rock Island, Ill.

# AMC Leaders Meet With Industry on Lance System

Top management officials of industrial firms working on the Army's new Lance missile system convened June 24 at Army Missile Command, Headquarters, Redstone Arsenal, Ala., to discuss progress on the weapon.

James J. Ling, president of Ling-Temco-Vought, prime contractor for the Lance system, and J. L. Atwood, president and chairman of the board at North American Aviation, Inc., a major subcontractor, headed the list of industrial participants.

General Frank S. Besson, Jr., CG of the U.S. Army Materiel Command, and his deputy, Maj Gen W. B. Bunker, indicated their keen interest in establishing and maintaining improved understanding and cooperation between the Army and weapons systems contractors by attending.

As the second one of its type conducted at the Missile Command, the session enabled high-level industrial officials to hold over-the-table discussions with military missile experts responsible for the development of new weapons.

Maj Gen John G. Zierdt, CG of the Missile Command, said he plans to meet periodically with top management officials of major industrial firms working on the Army's missile systems, and stated:

"These meetings have a specific purpose. We are looking for new ways by which we in the Army can assist the contractors, and vice versa."

Development of the Lance is under the direction of Col Walter E. Mehlinger, who heads the Lance Project Office at the Missile Command.

# Ammonia-Fueled Engine Operated at Fort Belvoir

Army Nuclear Power Field Office (NPFO) personnel at Fort Belvoir, Va., have successfully demonstrated an ammonia-fueled internal combustion engine, envisioned to operate on fuel produced by the Nuclear Powered Energy Depot.

Since the experiment was completed, responsibility for research on ammonia-fueled engines has been transferred from the Corps of Engineers to the U.S. Army Materiel Command.

Undertaken at the suggestion of Col Robert B. Burlin, director of the Army Nuclear Power Program, the recent experiment began with a literature search on ammonia engines.

Capt John T. Nappier, head of the NPFO Academic Training Section, completed the search and then procured a 1½-h.p. military standard engine, a cylinder of anhydrous ammonia and miscellaneous parts. Sfc Herbert L. Kappel, assisted by Sfc Frederick H. Urbin, then developed procedures in performing experimental modifications to the engine in their spare time.

A ½-h.p. electric motor was then connected to the crankshaft with a belt drive to aid in cranking the engine, and a kit, used to convert gasoline engines for operation with liquid petroleum gas, was installed.

At this point, the engine could be made to fire intermittently by closing the choke valve. Firing was improved through the addition of an external ignition system powered by a 12-volt battery, and by adjustments to increase spark plug and breaker point gaps. Operation of the engine, however, could not be sustained with ammonia.

Timing then was advanced and the engine, cranked with the electric motor, seemed to fire satisfactorily. Operation with the motor was continued until cylinder temperature reached operating level. When the motor was disconnected, the engine immediately increased speed and operated on ammonia for 30 seconds.

A minor adjustment to the choke valve brought success in the next attempt; the engine continued to operate on ammonia, although firing erratically. After this initial operation, choke valve, timing and spark plug gap adjustments produced satisfactory operating conditions.

Sfc Herbert Kappel (right) regulates air flow as Sfc Frederick J. Urbin connects start-up mechanism of experimental ammonia-fueled engine.

## Electronics Labs Sponsor High-Power Devices Meet

Some 300 engineers of Great Britain, France, Canada, and the United States attended the recent eighth biennial symposium on hydrogen thyratrons and modulators, sponsored by the U.S. Army Electronics Laboratories and the Working Group on High Power Devices, at Fort Monmouth, N.J.

Held biennially, the symposium provides an opportunity for an exchange of technical information among tube, components and applications engineers on design of pulse modulators and active components used in modulators.

Col James M. Kimbrough, Jr., USAEL director, welcomed participants and Kenton Garoff, director of the Laboratories' Electronic Tubes Div., gave the opening address.

Among 29 technical papers presented, three were by USAEL personnel: Hydrogen Cleanup, by Sol Schneider, John Creedon, and Norman Yeamans; Experiments With a Symmetrical Gradient-Grid Thyratron, by John Creedon; and Inductance Effects in Energy-Diverter Circuits, by George W. Taylor and Sol Schneider, symposium cochairmen.

## Duplex Cartridge Increases Target Encounter Capability

Army adaptation of the piggy-back ball point pen refill principle to a new "duplex" rifle cartridge—two bullets fired instead of one—significantly increases a soldier's probability of hitting his target at close range, test personnel report.

Similar in appearance to the conventional rifle cartridge, the ammunition is the product of several years of research by scientists of the Army Materiel Command's Frankford Arsenal at Philadelphia, Pa.

The second bullet is designed not to follow the first. Instead, it proportionately displaces the lead-off bullet and follows a path slightly off the course of the cartridge into which its nose is nestled—fitted into a machined cavity. An increase in the radius of the strike area results.

Together, the duplex bullets are proving considerably more effective than conventional 7.62mm. ball ammunition at ranges less than 150 meters. Designed for use in the Army's M14 rifle, the standard caliber used by NATO-member countries, the cartridge is being produced in limited quantities by Olin-Mathieson Co. for programs in continuing experiments.

# MUCOM Mechanical Engineer Details New Theory of Universe

An Army Munitions Command mechanical engineer whose hobby is higher mathematics has developed a new theory concerning the universe and has calculated a prediction of the speed at which other galaxies appear to be receding from the Milky Way.

Frederick M. Chakour, assigned to Munitions Command Headquarters at Rock Island, Ill., contends that the universe has a definite size, shape and mass. That theory is contrary to the prevailing belief that the universe extends outward without end.

Although he does not foresee any immediate connection between his work as a mechanical engineer in AWC's Operations Research Office and his hobby, Chakour points out that Einstein developed his famous nuclear fission formula ($E = MC^2$) 30 or 40 years before his theory was transformed into the atom bomb and used in warfare.

In a technical paper presented at the recent 10th Conference of Army Mathematicians at Watertown, Mass., Chakour discussed his theory in "Structure of the Observable Universe and Its Relation to the Gravitational Constant and Galaxy Red Shift."

Einstein's general theory of relativity is used by Chakour to support his theory of just what lies outside the universe. Einstein contended that clocks appear to slow down and objects apparently shrink when they are located in strong gravitational fields, that is, the stronger the gravitational field the more time, distance and mass appear to be reduced.

In his paper, Chakour theorizes that the gravitation surrounding the universe is just strong enough to reduce time, distance, and mass to zero. The logical conclusion is that in the area immediately outside our universe it would be impossible for anything to exist.

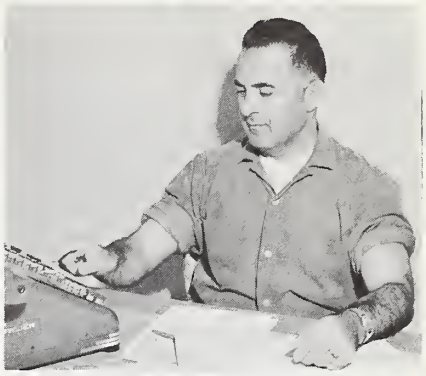
Chakour admits that there may be other universes beside ours, but his mathematical theory agrees with estimates of the size of our universe that have been made by other mathematicians.

Mathematicians use the speed of light (186,000 miles a second) as a yardstick to estimate the size of the universe. Light circles the earth more than seven times in one second. Chakour estimates it takes light 75,000 million years to circle the universe.

In mathematical terms, he explains the basic nature of the gravitational constant, a problem that has intrigued physicists and mathematicians for centuries. Chakour says of his theory, "It's either a terrific coincidence or I'm awfully lucky to have worked this out." He has worked on his theory for the past five years in his spare time, developing and checking the mathematical formulae involved.

Another part of Chakour's paper predicts the speed at which stars in other galaxies appear to be moving away from the Milky Way, in the form of a mathematical curve. As the stars move away from the earth, the light they give off shifts to the red end of the color spectrum. The farther away the stars appear to move, the redder their light appears.

Chakour's curve relates the intensity of the red light to the distance of the stars from the earth. Astronomers have observed the redness up to a point covering about 4.8 billion light years away. His curve predicts the redness of the stars up to a distance of about 13 billion light years from the Milky Way.



Frederick M. Chakour

Chakour questions that either of the two parts of his theory is final and hopes to use his leisure time to keep refining calculations—positively to prove or disprove his theories.

## WRAIR Scientist Benefits by Army Study Fellowship Award

Joseph Bruton of Walter Reed Army Institute of Research, Washington, D.C., is involved in a one-year study at Georgetown University under a Secretary of the Army Research and Study Fellowship.

The 37-year-old biochemist says he has never "worked harder or enjoyed it more." When he finishes his project early in 1965, he hopes to have made significant advances in research on the biosynthesis of streptomycin and laid important groundwork on his Ph. D. thesis.

Bruton's research concerns the structure of streptomycin, an antibiotic which has been known and used for many years. The chemical structure has been completely elucidated and considerable information has been accumulated regarding the reactions of this complex molecule. Little is known, however, regarding the reason for its production by the organism.

The study of antibiotic synthesis and degradation is important to the Military Services as prevention and treatment of infectious diseases is a primary medical mission. His research is original and it qualified for a Secretary of the Army Fellowship as being of immediate value to the military.

The Fellowship serves a dual purpose: to broaden the educational background of the individual in his chosen field; to enhance the research program of the Army by helping it to meet its continuing need for highly qualified researchers.

Bruton is the second successful candidate for the Fellowship at Walter Reed Army Institute of Research. The other was Dr. Louis Baron, chief of Immunology, who carried out a project on bacterial genetics at Stanford University in 1961-62. There has been only one other recipient in the Army Medical Service since the Fellowship program was started in 1956.

A native of Orlando, Fla., Bruton came to Washington, D.C. in 1946. After a tour of duty in the Army, he earned his B.S. degree in chemistry from Howard University. He came to Walter Reed Army Institute of Research in 1951 as a biochemist and was named chief of the Steroid Chemistry Section, Department of Metabolism, in June 1961. He earned his master's degree in chemistry from Georgetown University in 1957.

Joseph Bruton

# Electron Microscope Viewed as Cancer Research Aid

Reports at an international symposium indicate that scientists may be getting closer to weighing large molecules and, as a result, possibly closer to controlling cancer and many inherited diseases.

The Armed Forces Institute of Pathology (AFIP), Washington, D.C., was host to the recent meeting on quantitative electron microscopy which produced the optimistic view.

The electron microscope, according to Lt Cmdr Jude R. Hayes of the AFIP Biophysics Branch, is the key to obtaining knowledge of the weight of individual particles and large molecules, which make up all living things, and to providing insight into mechanisms controlling basic life processes.

The device has been in existence for 20 years. Only recently, however, has it been used chiefly to determine size, shape and weight of a particle. Now, researchers indicate, it may determine other properties, such as chemical composition.

The powerful instrument uses the short electron waves rather than the much longer light waves used in ordinary microscopes. This permits inspection of particles and large molecules only a fraction as big as the tiniest particle measured by the most powerful light-beam microscope.

Dr. Hayes said the symposium, which drew more than 80 top scientists from this country and six foreign countries, enabled experts to present their ideas on how to develop the techniques further. "Lively debates" helped point out the areas where more research is needed.

"We must first understand life mechanisms at the molecular level before we can hope to control disease," Dr. Hayes said. "This symposium moved us forward in clarifying where we stand and what direction our research in quantitative electron microscopy should take."

The symposium was unique, he said, in that it was the first on quantitative electron microscopy held anywhere which allowed scientists to debate with no audience. It was sponsored jointly by the Armed Forces Institute of Pathology and the Intersociety Committee for Research Potential in Pathology, Inc.

Results will be published soon as the Symposium on Quantitative Electron Microscopy, edited by Gunter F. Bahr, M.D. and Elmar Zeithler, Ph. D., of the AFIP staff.

### Missile Command Employee Cited

The U.S. Army Missile Command's Dolly Flowers, a management analyst at Redstone Arsenal, Ala., was recently elected state president of the Business and Professional Women's Club, and appointed to the Governor's Commission on the Status of Women, currently conducting a statewide study in various fields looking for inequalities in the work status of women.

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***THE HELPERS.*** **Mencius spoke about the man of Sung who was impatient about the fact that his grain was not growing fast enough. So he pulled it up a bit. Returning home, he said to his folks, "I am very tired, because I have been helping the grain to grow." The son ran out to look at the results and found all the grain withered.**

## Chemical Association Elects CRDL Commander President

Col William G. Willmann, commander of the U. S. Army Chemical Research and Development Laboratories, Edgewood Arsenal, Md., has been elected president of the Chesapeake Chapter of the Armed Forces Chemical Association.

Other Edgewood Arsenal employees on the slate of new officers are Dr. William H. Summerson, chief scientist, vice president for publicity, and Mr. Kenneth P. Moseley, chief of the Facilities Division in the Directorate of Engineering, Industrial Services, vice president for membership.

A graduate of Lehigh University and a veteran of more than 20 years of Army service, Col Willmann is a registered professional chemical engineer. He served at Edgewood Arsenal for a brief period in 1942, immediately after receiving his commission in the Chemical Warfare Service Reserve.

In July 1962, he reported to Edgewood Arsenal for duty as assistant for Technical Operations with the U. S. Army Chemical-Biological-Radiological Agency. Reassigned as Director of Commodity Management in May 1963, he became the Laboratories' commander in October.

**Dr. Nicholas N. T. Samaras, recently appointed assistant director of Defense Research and Engineering for Chemical Technology, DA, is welcomed at the U.S. Army Edgewood Arsenal Chemical R&D Laboratories (CRDL) by Col William G. Willmann, Laboratories' commander. The occasion marked Dr. Samaras' first visit in his official capacity to the Arsenal and to CRDL. During his day-long tour, he met with Brig Gen Fred J. Delmore, CG of the Arsenal, as well as with Col Willmann and Dr. Seymore D. Silver, CRDL technical director. Discussions concerned organization and scientific research programs of the Arsenal.**

## Test Directorate Member to Command 3rd Armored

Col Frank Duda

An original member of the U.S. Army Test and Evaluation Command's (USATECOM) 8-man test directorate team is the new commander of the 3rd Armored Division Artillery in Germany.

When the USATECOM was organized in August 1962 at Aberdeen Proving Ground, Md., Col Frank Duda, 48, was selected as the first director for Electronics Materiel Testing. His successor is Col B. Boyce, who reported from Ft. Sill, Okla.

Col Duda has served in Europe (participating in the Normandy Invasion, June 1944), Korea and Japan. Service courses and schools he has completed include the Artillery Officers' Advanced Course, the Command and General Staff College, the Armed Forces Staff College, and the Air War College. He holds a master's degree in international affairs from George Washington University and was commissioned in the Field Artillery after graduating from Xavier University in 1940.

The Field Artillery Materiel Testing Directorate is one of eight USATECOM Directorates responsible for testing all Army materiel in the fields of aviation, air defense, motor, electronics, CBR, general equipment and infantry.

# Tropic Test Center CO Retires for Civilian Job

Col Robert T. Larson, commander of the U.S. Army Tropic Test Center, Fort Clayton, Canal Zone, will retire from the Army July 31 after 26 years service.

Col Larsen, who has accepted a position with the Rand Corp., Santa Monica, Calif., in the Aero-Astronautics Department, activated the Tropic Test Center. During the two years he served as commander, he planned and conducted some 150 tropical research and test projects.

Annual operations and project costs currently exceed $12 million and more extensive facilities and an increase in personnel are in the planning stage at the Tropic Test Center.

Under his leadership, the following units have been attached to the Center: U.S. Army Meteorological Team (RDT&E Support); Special Operations Research Field Office; U.S. Air Force Scientific and Technological Liaison Office; Advanced Research Projects Agency Team, Department of Defense.

Previously, he served as chief of the Special Projects Branch, Plans and Operations Section, Hq., Sixth Army; Operations Officer, Plans and Operations Section, Far East Command; Company and Special Troops Commander, Eighth Army, Korea; and as an instructor at the U.S. Army Infantry School.

Col Larson holds the following decorations: Legion of Merit, Korean Presidential Citation, Bronze Star Medal with three Oak Leaf Clusters, Silver Star, French Croix de Guerre with silver star, Purple Heart with Oak Leaf Cluster and Combat Infantry Badge.

He has an M.S. degree from Oregon State University and B.A. from the University of California at Los Angeles, and is a graduate of the U.S. Army Infantry School and the Command and General Staff College.

Col Robert T. Larson

## Springfield Armory Displays Weapons at Ordnance Parley

Springfield (Mass.) Armory's role in the research and development of air and surface armament for the U.S. Military Services was demonstrated this past month to more than 250 members attending the meeting of the Hartford-Springfield Post, American Ordnance Association.

Col William J. Durrenberger, commanding officer of Springfield Armory, served as host and was the principal speaker.

Newly developed aircraft weapons demonstrated by Armory Research and Engineering Division personnel at the Quabbin Test Range, using live ammunition, included the XM13 system, consisting of the SM75 grenade launcher in a pod mounting for fixed-wing aircraft.

Shown also were the SM5 system, consisting of the XM75 launcher in a pod designed for a light observation helicopter; the M6 system, using four M60C machineguns, two on each side of the UH1B helicopter; and the XM19 system, utilizing two M60C machineguns on a fixed-wing aircraft.

Other weapons demonstrated were the 20mm. M61 aircraft cannon, capable of firing at a rate of 6,000 rounds per minute, and its smaller 7.62 counterpart, the Minigun; the M14 rifle with its folding stock modification (M14E1) and the heavier automatic version (M14E2); the M16 rifle; the M79 grenade launcher; and the M60 pedestal jeep-mounted machinegun.

# *Natick Trainee Achieves Engineer Status in 8 Years*

From high school student trainee to full professional status as a mechanical engineer at the U.S. Army Natick (Mass.) Laboratories is the 8-year record of achievement of Lee Edward Rogers, 26-year-old civilian employee.

In 1956 he was the first recipient of the Natick Laboratories Research Director's Scholarship, awarded annually to a Natick High School student who has been accepted in the cooperative program at Northeastern University, and who plans to major in one of the physical sciences.

As a member of the National Honor Society at the time, Rogers was considered well qualified for the appointment. The cooperative program provides for alternate periods of class attendance at Northeastern and actual on-the-job training.

Graduated from Northeastern University in 1961 with a B.S. degree in mechanical engineering, Rogers was a member of the ROTC and commanding general of the cadet brigade. Shortly after graduation he joined the Army in the Corps of Engineers, serving two years, part of the time as a company commander at Fort Campbell, Ky., and then returned to Natick.

Promoted recently to full professional status he is a member of the American Society of Mechanical Engineers, the Society of American Military Engineers, and Army Reserve.

The taste for engineering seems to run in the Rogers family. His younger brother Alan, 17, who will graduate from Natick High School in June, has been awarded a $1,000 scholarship to Northeastern University by the Boston Edison Co. Alan intends to enroll in a course leading to B.S. and M.S. degrees in power engineering and will work at Edison between school sessions during a 6-year period.

**Lee Edward Rogers, second from left, is congratulated on recent promotion to full professional status by Brig Gen Merrill L. Tribe, commanding general, U.S. Army Natick Labs, Dr. Dale H. Sieling, scientific director, second from right, and Henry R. Rose, civilian personnel officer.**

# DoD Sets Up Training Fund for Employees

Deputy Secretary of Defense Cyrus R. Vance has directed the Military Departments and Defense agencies to set aside a central pool of funds and manpower spaces to be used for long-term education and training of key civilian employees of the DoD.

The objective of this action is to insure that the means are available to give technical, professional and managerial employees the training and education needed to keep them abreast of the rapid changes taking place in scientific technology and in management systems.

Another objective of the Deputy Secretary's memorandum is to provide for long-range planning for the career development needs of key personnel and the development of forecasts of needs through FY 1969.

While considerable use has been made previously of short training courses to meet the development needs of DoD civilian employees, only a small number of employees have received significant long-range training.

While any such training must be related to specific needs, it is expected that the previous high of 139 employees participating in training over 120 days in any one year should more than double in the future.

Under this program, employees will receive training and perform research in a wide range of areas related to their work at universities and other non-Government institutions. Typical examples of the type of subject areas in which development needs are known to exist are aerospace medicine, applied mathematics, cartography, physics, operations research, nuclear engineering, and radiology.

The rate of advance in these and many other areas is such that it is of importance to the effectiveness of Defense components that more time and resources be devoted to maintaining and improving the competence of existing staffs, it was explained.

## AFCEA Cites 4 Employees Of Electronics Command

Four members of the Fort Monmouth Chapter of the Armed Forces Communications and Electronics Association received awards during the recent annual AFCEA convention in Washington, D.C.

Meritorious Service Awards were presented to Maj Gen Frank W. Moorman, commanding general, U.S. Army Electronics Command, and Dr. Hans K. Ziegler, the Command's chief scientist and a national director of AFCEA. General Moorman was elected to the AFCEA Board of Directors for a 4-year term.

Accompanying citations recognized them individually for "executive leadership, outstanding dedications, and professional guidance in position(s) of great responsibility in association affairs."

Honor Award Citations were presented to A. W. Rogers, chief engineer of USAECOM, and James A. McClung, chief of Programs and Events in the Office of Administration and Services, Army Electronics Laboratories.

Rogers was cited for distinguished service during his recent term as president of the chapter and in recognition of "his outstanding contributions and devoted services to the aims and objectives" of the association.

McClung was commended for distinguishing himself as chairman of AFCEA symposium program arrangements and for his contributions to overall aims of the organization.

# ICAF Deputy Director Assigned to Germany

Maj Gen Tom R. Stoughton this month completed his tour as deputy commandant, School of Resident Studies of the Industrial College of the Armed Forces, Fort Lesley J. McNair, Washington, D.C., and is now commander of U.S. Army Area Command, Frankfurt, Germany.

Deputy commandant at ICAF since September 1962, he previously commanded the 7th Infantry Division in Korea. ICAF is the Nation's highest educational institution teaching the management of logistic resources for national security and operates under Joint Chiefs of Staff supervision.

Maj Gen T. R. Stoughton

Graduated from the U.S. Military Academy in 1930, he returned in 1941 to serve on the faculty in the Department of Modern Languages (Spanish). This tour was interrupted by World War II and in 1943, after a short course at the Command and General Staff College, he was assigned to G–4, Hq, ETOUSA, in London, England.

Following graduation from the Army War College, Carlisle, Pa., he was assigned to the faculty until June 1955, when he was promoted to brigadier general and assigned as chief of staff of the Alaskan Command. In June 1958 he was assigned to the Office of the Deputy Chief of Staff for Personnel, Department of the Army.

## SCIENTIFIC CALENDAR

6th International Congress of Biochemistry, sponsored by the International Union of Biochemistry, N.Y.C., July 26-Aug. 8.

4th International Congress of International Commission of Photobiology, Oxford, England, July 27-30.

Symposium on Karstic Phenomena, sponsored by the International Geographical Union, Settle and Buxton, England, July 28-Aug. 4.

Symposium on Radiation, sponsored by the International Union of Geodesy and Geophysics, Leningrad, Russia, July 28.

3rd Meeting of International Society for Human and Animal Mycology, Edinburgh, Scotland, July 30-Aug. 1.

Technical Symposium of International Cartographic Association, Edinburgh, Scotland, July 31-Aug. 4.

5th Symposium on Reactivity of Solids, sponsored by the International Union of Pure and Applied Physics and International Union of Pure and Applied Chemistry, Munich, Germany, Aug. 2-8.

7th Heat Transfer Conference and Exhibit, sponsored by ASME and AICE, Cleveland, Ohio, Aug. 9-12.

Symposium and Workshop on the Quantification of Human Performance, sponsored by the University of New Mexico and the Electronic Industries Assn., Albuquerque, N. Mex., Aug. 17-19.

Annual Meeting of American Institute of Biological Sciences, Boulder, Colo., Aug. 23-28.

Astrodynamics Guidance and Control Conference, sponsored by the American Institute of Aeronautics and Astronautics, Los Angeles, Calif., Aug. 24-26.

11th Petroleum Industry Conference, sponsored by IEEE, San Francisco, Calif., Aug. 24-26.

69th Joint Summer Meeting of American Mathematical Society and Mathematical Association of America, Amherst, Mass., Aug. 24-28.

Summer General Meeting and Western Electronics Show and Convention, sponsored by IEEE, Los Angeles, Calif., Aug. 25-28.

Congress for Logic, Methodology and Philosophy of Science, sponsored by the International Union for the History and Philosophy of Science, Jerusaleum, Israel, Aug. 26-Sept. 2.

Symposium on Reactive Intermediates in Organic Chemistry, sponsored by the Chemical Institute of Canada, Quebec City, Quebec, Canada, Aug. 27-29.

148th National Meeting of American Chemical Society, Chicago, Ill., Aug. 30-Sept. 4.

11th International Inter-Congress of International Union of Theoretical and Applied Mechanics, Munich, Germany, Aug. 30-Sept. 5.

National Technical Conference, sponsored by the Illuminating Engineering Society, Miami Beach, Fla., Aug. 30-Sept. 3.

8th Congress of International Society of Soil Science, Bucharest, Roumania, Aug. 31-Sept. 9.

9th International Congress of Biological Standardization, sponsored by the International Association of Microbiological Societies, Lisbon, Portugal, Sept. 1-9.

# DSA Takes Task of Consolidating Contract Offices

Field contract administration offices of the Military Departments will be consolidated under Defense Supply Agency management, extending over a 2-year implementation period.

Secretary of Defense Robert S. McNamara announced June 5 the assignment of overall management responsibility to the DSA. The date for initiation of the plan, an outgrowth of Project 60, was not disclosed.

Expected to yield a savings in manpower of approximately 10 percent, with attendant reduction in overhead costs, the consolidation is based upon findings of a study started in August 1962 to examine the organization and procedures of field offices for supervising the performance of contracts after they are awarded.

Industry will benefit under the consolidation, it was stated, in that procedures will be simplified and there will be a reduction in the number of Defense Department activities dealing with contractors.

A national planning group will be established under the Director of DSA to develop a plan for consolidating the more than 150 affected contract administration services offices, employing in excess of 20,000 people, into a common support service to all Department of Defense and National Aeronautics and Space Administration procurement offices.

The services to be provided by this organization consist of such functions as inspection and acceptance of material, accounting for Government property, security clearance of contractor facilities and personnel to handle classified information, and payment of contractors.

The plant representatives of the Army, Navy and Air Force who are situated at key plants producing major weapon systems are not involved in the consolidation. They will continue to report to their respective Military Departments.

Other offices not affected by the consolidation are such specialized groups as the Army Corps of Engineers, Navy Bureau of Yards and Docks, and Navy Supervisors of Shipbuilding.

## 2 SATCOM Engineers Receive M.S. Degrees in Management

Two engineers of the U.S. Army Satellite Communications (SATCOM) Agency received M.S. degrees in industrial management recently at the 92d commencement exercises of the Stevens Institute of Technology in Hoboken, N.J.

They are James P. McNaul, assistant technical director of the SATCOM Agency, and John C. Cittadino, mechanical engineer in the Test Evaluation Branch. Both are satellite communication pioneers who have been with the SATCOM Agency since 1941.

Mr. McNaul, who recently won a Sloan Ph.D. Fellowship, will continue his studies at Stanford University. He received his B.S. degree in electrical engineering from the University of Wisconsin in 1956.

Mr. Cittadino, who also has made significant contributions to the system engineering aspects of the military satellite communications program, is employed in the testing and evaluation of SYNCOM II, the synchronous orbit communications satellite launched by NASA last summer.

# Army Participates in GLOBECOM Meet

The U.S. Army Electronics Command and Fort Monmouth, N.J., were represented by several speakers at the recent International Symposium on Global Communications, GLOBECOM VI, at the University of Pennsylvania.

Attended by more than 1,000 engineers, scientists and technicians from the Free World, the symposium was sponsored by the Institute of Electrical and Electronic Engineers and University of Pennsylvania.

One of the well received technical papers was presented by Army Materiel Command project manager, Rudolph C. Riehs, director of the Transmission Division, U.S. Army Electronics Laboratory. Riehs served on the symposium's Technical Program Committee and chaired a session on commercial satellite communications.

ECOM's Col H. F. Foster, Jr., UNICOM/STARCOM project manager, spoke on "UNICOM System Objectives" at a session on Switching Systems. He discussed the fundamental objectives of UNICOM—the development of facilities for an integrated worldwide communications switching system responsive to the needs of the President, military commands and selected Government agencies.

A paper on "Fine Grain Ionospheric Behavior" by Bernard Goldberg, L. B. Shucavage and J. F. Corte of the Electronics Laboratories was presented to the Radio Transmission technical session. The paper related analysis of basic data to the fine-grain structure of phase stability and amplitude variations of a continuous wave signal.

"The Results of Intelligibility and Articulation Experiments Using the Syncom Satellite" was prepared by W. G. Tobias, J. W. Lockett and J. C. Cittadino of the U.S. Army Satellite Communications Agency.

The paper described the procedure and techniques used in analyzing and evaluating the voice capability of the SYNCOM II system and compared the results of intelligibility tests with a listener panel and a voice interference analysis set.

Rudolph C. Riehs

GLOBECOM CONFERENCE speakers (l. to r.) John C. Cittadino, William T. Tobias and John W. Lockett of USASCA, Fort Monmouth, N.J.

# AROD Scientist Aids German Research

Dr. Theodor W. Schmidt, head of the Systems Research Office, U.S. Army Research Office-Durham (N.C.), is spending two months of the summer in Braunschweig, Germany, collaborating in the work of the German Research Institute for Aeronautical and Interplanetary Aviation.

The invitation stemmed from Professors K. H. Doetsch and H. Blenk, both of whom have created close ties with the Army's European Research Office in Frankfurt. He will work on the problem of error fields connected with ground-based tracking stations, and has been invited to lecture on selected problems in this subject area at the Braunschweig Institute of Technology.

The German Research Institute includes within it an Institute for Piloting, and an Institute for Aeronautical Radio and Microwaves. The Institute for Piloting handles problems of aeronautical tracking and navigation, and recently started work in interplanetary aviation.

Similar work is also being done at the Institute for Aeronautical Radio and Microwaves, including specific work on the theory of errors.

Dr. Schmidt was associated with Professor Blenk, now vice president of DFL, and worked at Braunschweig before and during World War II. The current invitation was stimulated in part by publication of Schmidt's paper, "The Error-Field Associated with Instrumentation for Position Determination," presented at the Army Science Conference in 1962.

Dr. Schmidt has served 10 years with the United States Government and joined the staff of AROD in 1957, having previously served as chief of the Scientific Study Group, White Sands (N.Mex.) Missile Range.

An original member of the Operations Research Team (DORT) of the U.S. Representative, North Atlantic and Mediterranean Areas (DEFREPNAMA), Dr. Schmidt in 1963 received a commendation for professional guidance furnished to Italy and Germany in connection with NATO lightweight strike reconnaissance (LWSR) aircraft operations.

Schmidt's work, it was stated, had enhanced the day and night combat effectiveness of NATO's tactical air forces. In May 1964 he received a commendation from Maj Gen Joseph R. Holzapple, USAF, acting director, Weapons Systems Evaluation Group, Office of the Director of Defense Research and Engineering, for his work as a consultant to WSEG on an important action for the Secretary of Defense, U.S. Department of Defense.

Dr. Theodor W. Schmidt

## ERDL Tests Lighting Device To Aid Remote Area Aircraft

A glide-angle-indicator light is being tested to assist Army aircraft landings at night in remote areas.

Designed by the U.S. Army Mobility Command Engineer Research and Development Laboratories, Fort Belvoir, Va., the light can be dropped by parachute into forward landing areas and set up in five minutes by one man.

Easily leveled and aligned in azimuth and elevation, it automatically projects a high intensity tri-colored beam. A fixed- or rotary-wing craft coming in on the green beam has a good approach. On the red beam it is too low, and on the yellow, too high.

The separation between the projected beams is approximately two minutes of arc apart to eliminate blind spots at three miles. A special trichromatic filter and elliptic reflector were designed for the projection system to meet this stringent optical requirement.

The unit weighs approximately 25 pounds and is contained in a package measuring less than one cubic foot. It operates from its own nickel cadmium battery or from a jeep's 24-28 volt DC power supply.

The test model was built by Bulova Watch Company, Woodside, N.Y. under contract with the Laboratories.


AIRCRAFT LANDING GUIDE automatically projects a high intensity tri-colored beam that indicates whether aircraft coming in for a landing is on course, too high or too low.

## Missile Command Names P&P Directorate Chief

An Army officer who has had careers as a chemist, high school teacher and college professor has been named executive officer of the U. S. Army Missile Command's Procurement and Production Directorate.

Lt Col Stanley W. Tyler has taken over the post after having served as special assistant to procurement operations. A native of Lynn, Mass., he came to Redstone Arsenal, Ala., earlier this year from Addis Ababa, Ethiopia, where he was logistics advisor to the Imperial Ethiopian Ground Forces.

In other assignments, he has worked worked in the Office of the Inspector General, Department of the Army, in Washington, Boston and New York, and as chief of the Pitman Dunn Laboratories Group at Frankford Arsenal in Philadelphia.

Col Tyler is a graduate of the University of Massachusetts where he received his B.S. degree in chemistry. After studying briefly at Massachusetts Institute of Technology, he entered Staley College, where he earned his B.A. and M.A. degrees and was presented an honorary Doctor of Arts degree.

Lt Col S. W. Tyler

# Engineer R&D Labs' Mission Grows as Mobility Command Sets Up Materiel Centers

U.S. Army Mobility Command consolidation of nine separate field installations into three major materiel centers made the Engineer Research and Development Laboratories, Fort Belvoir, Va., a subordinate element of the Mobility Equipment Center, St. Louis, Mo., effective July 1.

Col J. H. Kerkering, ERDL commander, announced the change as part of the overall realignment of command lines and functions within the Mobility Command. The Laboratories, which previously reported directly to the CG of MOCOM, will remain in their present location and will have a slight increase in personnel.

The Army Aviation Materiel Command (AVCOM) is another of the materiel centers. The Army Tank-Automotive Center (ATAC) is in Warren, Mich. All three centers are authorized to deal directly with Army Materiel Command Headquarters.

Under the July 1 change, the Engineer R&D Laboratories will assume an additional responsibility for rail, marine and amphibious equipment. Establishment of a Surface Engineering Branch of the Laboratories in St. Louis will transfer these functions from AVCOM.

The new branch will report directly to Turner G. Timberlake, chief of the ERDL Engineering Department, and will have a staff of about 50 personnel. Its functions are principally preprocurement engineering preparation and engineering support during quantity procurement of Army rail, marine and amphibious materiel.

Research and development responsibility for the same type of equipment is being transferred from the U.S. Army Transportation Research Command at Fort Eustis, Va., which will become an R&D Directorate of AVCOM with an exclusive mission in the field of air mobility.

## Battelle Booklet Discusses Ocean Engineering Potential

Ocean engineering as the means for exploiting resources of the sea and creating new industries is the subject of an illustrated booklet published recently by Battelle Memorial Institute's Columbus, Ohio, laboratories.

The 8-page statement, now being offered to business and industry, underscores the importance of ocean engineering with the observation that new "tools" for exploiting the oceans could well be the basis for another "industrial revolution."

The booklet emphasizes the potential value of resources in the ocean and beneath the ocean floor, including food, chemicals, metals, coal, oil, construction materials, and the untapped energy of the tide and of heat sources in the ocean's sub-floor.

Highlighted is a new technology called "telechirics" which is concerned with the development of fully controlled yet unmanned, mechanical devices to perform practically any task in an ocean environment.

Copies of the booklet may be obtained from Publications Office, Battelle Memorial Institute, 505 King Ave., Columbus, Ohio 43204.

## WRAIR Picks Dermatology Chief

Maj Benjamin T. Wells has been named chief of the Dermatology Department at Walter Reed Army Institute of Research, Washington, D.C., following return from a 3-year tour of duty at the Second General Hospital, Landstuhl, Germany. After receiving his M.D. from Baylor University in 1953, he interned at Brooke Army Hospital, Fort Sam Houston, Tex. (1953–1954). In 1961 he received an M.S. in dermatology from the University of Minnesota.

# Navy Tests Army Night-Vision Equipment on Carrier

U.S. Army night-vision equipment may go to sea with the Navy, since a remote view image intensification tube developed by the Army Engineer R&D Laboratories, Fort Belvoir, Va. has been successfully tested aboard an aircraft carrier as a means of making night aircraft landings safer.

Daytime landings on the flat tops are guided and monitored by a pilot landing aid television system known as PLAT. This system employs television cameras mounted in the flight deck and on the centerline of the ship. Each landing and take-off is monitored and recorded on video tape to aid the landing safety officer in directing the landing approaches.

With the incorporation of the Army image intensifier orthicon tube, the PLAT system can now perform this function at night without the aid of flood lighting. Developed to provide a remote viewing capability to Army commanders, it operates on starlight, moonlight, or even skyglow. It achieves its high sensitivity through the utilization of an image intensifier section coupled to a high-gain target image orthicon all in one envelope. The intensifier acts as a preamplifier to brighten the input image.

Lab engineers collaborated with Navy personnel to perform the trial modification, which reportedly has worked so successfully that the Navy is considering use of the image intensifier on a large number of its aircraft carriers.

# Army Ordnance Veteran Heads Missile R&D Directorate

An Army Ordnance officer who has served in military duties from Europe to Korea has been named to head the Army Missile Command's Research and Development Directorate.

Lt Col Stanton W. Josephson (nominated for promotion to colonel) replaced Col Daniel F. Shepherd who recently retired from active military duty, and will oversee work in eight laboratories concerned with missile-related technology. He filled Missile Command's top R&D post after completing the Armed Forces Industrial College in Washington, D.C.

A graduate of the U.S. Military Academy at West Point, N.Y., Col Josephson received his B.S. degree in 1942 and was awarded an M.S. degree in meteorology from the University of California at Los Angeles, in 1948. He has completed the Advanced Officers Course at the Ordnance School, Aberdeen, Md., and the Command and General Staff College, Fort Leavenworth, Kans.

Commissioned a second lieutenant in 1942, he served in the European Theater during World War II with the 28th Infantry Division.

During the Korean War, he was executive officer of the First Ordnance Battalion. Following three years service in Hawaii, he returned to the United States for duty with the Atomic Energy Commission, then was stationed in Germany.

**Lt Col S. W. Josephson, director of R&D Directorate, Army Missile Command, pauses in front of recently completed Francis J. McMorrow Missile Laboratories at Redstone Arsenal, Ala.**

# Research In Review...

(*Continued from page 17*)

related to medical support are striving diligently to reduce the "art" in medicine and increase its scientific nature. New drugs are constantly needed. Much more basic information of fundamental biochemical mechanisms of action is needed to give rational direction to the search for prophylactic and healing drugs.

A few areas of special importance to the Army are means to reduce or eliminate the adverse effects of ionizing radiation; rapid identification, prophylaxis or treatment of new diseases not a problem for the U.S. civilian population because of geographic isolation or adequacy of sanitation; problems associated with multiple and extensive traumatic wounds; problems of rapid acclimation to environment extremes; and the psychological stresses of the military environment.

*Specialty Items for Combat Support.* These mundane items fall in the category of the lengendary horseshoe nail—"For want of a nail, the shoe was lost . . . etc." The chemist must develop new finishes such as paints, platings, or other surface treatments to protect equipment from both enemy and nature's attack. Oils, hydraulic fluids, lubricants for moving parts are all far from ideal for present and future weapon and mobility systems.

The chemist who discovers a truly high-temperature lubricant will notably increase engine efficiency. Many times it is now cheaper to truck water long distances to supply the needs of man and machine than to utilize current purification means on locally available swamp, brackish or saline water sources.

The eradication of insect and small animal pests is a major problem for the field Army. Truly amazing is the range in size and the vast number of creatures which enthusiastically sting, suck, chew and generally devour or deteriorate soldiers and their equipment. Both plant and animal kingdoms are liberally represented. These pests provide major challenges to the chemist for cheap materials which are tactically feasible for use in this ancillary war of modern military field operations.

*General Materials Research.* Though some may take exception to inclusion of this category, it is important for a complete picture of the Army chemical program. Many concepts and interesting phenomena languish on the shelf for lack of materials capable of supporting their feasible exploitation. Some challenges facing the materials scientists are:

- An unsatisfactory state of macro- and micro-analytical mechanics and design criteria—the objective is "molecular engineering" to design a material for its specific job rather than to stumble on it or use a poor compromise.
- A need for higher strength-to-weight-ratio materials suitable for operations at extremes of temperature.
- A need for materials providing improvement in generation, coversion, transport, and storage of electromagnetic energy.
- Improvement in armoring, shielding, and dampening (noise and vibration) materials.
- Better materials which are compatible with body elements and fluids for use in prosthetic devices to repair or replace tissues or structures.
- New processing and production methods for old and new materials.
- New manufacturing techniques to exploit refractory materials which are now laboratory curiosities.
- Improved materials to replace those adapted from civilian construction industries but which cannot endure in the military environment.

More specifically, the *U.S. Army Materials Research-Exploratory Development Program* may be roughly divided into three broad general categories. Materials sciences exploratory and oriented basic research includes solid-state metallurgy, structure of metals and ceramics, physical and mechanical properties, along with solid-state physics and materials mechanics (materials oriented activity in other scientific disciplines), chemical metallurgy and ceramics and polymer chemistry.

Structural and special purpose applied materials research includes analytical mechanics and design criteria, higher strength-to-weight ratios, operations at extremes of temperature, biomechanical applications, optical, manufacturing techniques and applications, general construction materials, test and evaluation of materials, information collection and dissemination, armor, shielding and damping.

Materials applied research for control of deterioration and wear covers coolant system conditions, hydraulic fluids, surface treatment, test equipment, friction and wear investigations, paints and plating.

Under the heading of *U.S. Army Chemistry and Chemical Engineering Research and Exploratory Development Program*, areas of major interest may be listed under nine major subtitles:

*Basic Research* involves physical chemistry, organic and inorganic theory, analytical principles, polymer science, metallurgy, pharmacology-toxicology, biochemistry, molecular biology, molecular structure and properties, combustion and propulsion, surface phenomena, reaction mechanisms, organic and inorganic synthesis, and catalysis.

Dr. F. W. Morthland

Dr. F. W. Morthland, assigned to the Scientific Analysis Branch, Life Sciences Division, has been a member of the U.S. Army Research Office key professional staff since March 1960. This month he departs for the U.S. Army Element, Defense Research Office, Rio de Janeiro, Brazil, as deputy chief of the element and scientific adviser. Harold F. Weiler, presently assigned there, returns to fill the Life Sciences vacancy.

Dr. Morthland will provide liaison with the life sciences community in the Latin American countries with the joint staff of the Regional Science Office, South America, U.S. State Department.

His first experience with the U.S. Army was during World War II as a weather officer with the Army Air Force. After the war, he returned to the University of Chicago, where he had earned a master's degree, and completed study for a Ph. D. in physico-organic chemistry.

Assignment as a research associate on the staff of the university led to subsequent positions in the Radiochemical Division, Abbott Laboratories, and five years as assistant chief of the Radioisotope Service, U.S. Veterans Administration Hospital, Indianapolis, Ind., before appointment to Army research.

Dr. Morthland's new assignment calls for contact with specific Latin American scientists, as requested by Department of Defense laboratories in the United States. He will be on the alert for research proposals or special, unique study opportunities of particular interest to the U.S. Army.

*Chemical and Nuclear Weapons and Defense* is concerned with toxicology-pharmacology, radiation effects, detection-identification, protection (physical and medical), chemical agents (natural and synthetic), accelerated degradation of materials, defoliants, decontaminants, chemical engineering processes and dissemination parameters.

*Individual Support* deals with nutritional chemistry, synthetic food production, food processing and storage, packaging materials, protective devices, textiles and fabrics, shelter materials, small energy sources, medicinal chemistry and pharmacology.

*Specialty Items* is a category that includes non-CBR (chemical, biological and radiological) barriers, fire fighting, water treatment, hydrocarbon fuels, soil stabilization, petroleum lubricants, insecticides, insect repellants, paints and platings.

*Power Sources* activities include fuel and solar cells, chemoelectric generators, magnetohydrodynamic generators, energy conversion and storage, nuclear sources and unconventional fuels.

*General Materials* is a subheading that covers materials properties (production, forming, testing and assay techniques), armor and shielding, prosthetics, refractories and substitutes.

*Metastable High-Energy Compounds* include propellants, explosives, pyrotechnics, incendiaries, smokes and allied substances.

*Materials for Intelligence Programs* pertain to screening, signaling, chemiluminescence, wet-dry photo, photoconduction and electroluminescence.

*Chemistry of Deterioration* deals with hydrocarbon fuels, microbiological and physico-chemical deterioration, and stability.

These, then, are the major areas of Army research, basic and applied, in chemistry and chemical engineering. The current effort is estimated roughly at $37 million annually, employing approximately 1,500 full-time in-house scientists and supporting personnel, plus an extensive contract and grant program.

These are estimates, since the lines of demarcation are faint and the overlaps with other disciplines are broad. Some 20 Army agencies and installations are active in chemical research in the United States. Through Army Research Offices in Europe, Latin America, Australia and Japan, liaison is maintained with and support is provided for leading foreign scientists.

Historically, and with increasing emphasis in response to rapidly changing requirements and concepts of modern warfare, as well as with respect to plans reaching far into the future, chemistry has a broad supporting role in the mission of the United States Army. Scientists and engineers working in materials and basic chemistry strive constantly to keep our combat capability, today and tomorrow, first in the world.

## Brig Gen Lollis Becomes Leader of 7th Logistical Command

Brig Gen Shelton E. Lollis, past deputy president to the U.S. Army Materiel Command Board, is the new commander of the 7th Logistical Command in Taegu, Korea. A University of Oklahoma graduate with a degree in electrical engineering, his military schooling includes attendance at the Command and General Staff College, Fort Leavenworth, Kans., and the Army War College at Carlisle Barracks, Pa.

General Lollis, promoted in June 1964, served as executive officer to the Assistant Secretary of Defense for Engineering from 1953 to 1956. Prior to assignment as deputy president of the AMC Board at Aberdeen Proving Ground, Md., in 1960, he was senior Ordnance officer, Military Advisory Group to the government of the Republic of China, Taiwan.

In the spring of 1963, he was one of five U.S. Army officers selected to attend the 43rd Advanced Management Program, a 3-month course conducted by the Graduate School of Business Administration, Harvard University.

Brig Gen S. E. Lollis

By Ralph G. H. Siu

### *EXECUTIVE & FISHERMAN*

Sitting in my office on a summer day, one of our colleagues in the R&D business bitterly bemoaned his working environment. "I'm getting out as soon as I can," said he. I wish I had remembered at the time the following story from Lionel Giles, *Gems of Chinese Literature.*

When Kutsugen was dismissed from office he went to Kotan, and sat sighing by the river. He looked like a skeleton, so paled and emaciated was he. A fisherman seeing him there said to him, "Are you not the Prime Minister? What may you be doing here?"

Kutsugen replied, "The whole world is filthy; I alone am clean. Everybody is drunk; I alone am sober. This is the reason I was dismissed."

The fisherman said, "A sage is not bound to things, is not the slave of circumstances, but follows them, acts in accordance with them. If the whole world is filthy, you must jump in the muddy water and splash about in it. If all men are drunk, drink with them. What is the good of meditating so profoundly and idealistically?"

Kutsugen said, "I have heard that when a man has washed himself he dusts his hat, and when a man has bathed his body, he shakes his clothes. How can he who has purified himself put on his old dirty clothes again? I would rather jump in this river and feed my body to the fishes. I will not allow my purity to be sullied by the defilements of this world!"

The smiling fisherman gave a chuckle, and rowed away; he said, keeping time with his oar,

"If the water of Soro is clear, I will wash the ribbon of my hat; if it is dirty, I will wash my feet in it."

This was all he said, and was gone.

*CORESPONSIBILITIES.* A story has been making the rounds of business magazines about the new administrative assistant who asked his boss: "Do you want me to review all your correspondence and reports?"

"That won't be necessary," the superior replied. "Review only those which have two or more initials. In those cases I find that nobody has really shouldered the responsibility."

# No. 1 Federal Science Leader Acclaims In-House Labs

(*Continued from page 15*)

it, because in order to continue to get good people into the organizations, and remain to become the heart of the organizations, I think we are going to have to make it clear that these things do not happen.

Those Federal laboratories having a well-established reputation for research excellence are good proof that these indictments are mostly myths. These are not laboratories populated by personnel who take pleasure in assuming that, for these reasons, nothing can be done in the exercise of intelligent discretion because they consider administrative arrangements to be bonds which tie them.

I think the laboratories that have been highly successful are the ones that are prevaded by the problem-solving spirit, both scientifically and administratively; which look on administration as the art of the possible. In the good cases, the Federal environment does, and in any case it can and must, accommodate the good ideas of strong men, but to do this it is necessary for the laboratory manager and the bench scientists to ask questions, probe for alternatives, and make sound proposals.

I think one of the great virtues of gatherings such as this is not only the free exchange of scientific ideas which goes on, but perhaps the permeation of ideas as to what can be done and what is done in other laboratories in the Federal Service. One hopes the end result will be to move in the direction of the best practices. Nevertheless, I just want to mention, since the questions I mentioned are asked, some of the freedoms which are not always recognized that are possible with the Federal system.

The Federal Council of Science and Technology, for example, a couple of years ago, recommended that the Federal Departments be permitted to authorize a flexible work week—a week in which a man might work until 10 p.m. one day and not come in until 2 p.m. the next day. We found, to our great surprise, that the Civil Service Commission says that this has always been possible and apparently it is.

So you see the opportunities for innovation are present here, too. There are, you all know, considerable freedoms permitted in the recruitment of people. In the case of outstanding Ph. D.'s, they can be recruited at up to two grades above their normal position. This applies to individuals with academic distinctions. Actually, at any level, individuals with recognized creative abilities may be recruited at above their normal classification.

Nevertheless, for the better science and engineering graduates, this is only one attraction. They like, I think, to feel an air of excitement in the laboratories. In addition to grade, there must be other conditions which attract them, and those conditions must be made known to them. I find that authority for temporary appointment exists and can be used in laboratories to attract outstanding people on temporary assignments, and I think some of those who are appointed temporarily can be persuaded to stay. Although a few labs make use of the device, my impression is that the use of temporary people on invitation is not common and it certainly can be used more frequently.

My impression is that it is healthy for every laboratory to maintain contacts with outside organizations. In the case of research laboratories, I would recommend strongly the virtue of maintaining contact with university people, because it is their graduates that we want to hire. . . .

The best managers have the self-confidence and drive to collect as much authority in their own hands as the upper levels of Government can be persuaded to release and they are always looking out for more. I think we need more men in laboratories with this kind of spirit.

I am not here to give you a sermon. It is important, however, in any good laboratory that merit be recognized in many ways. One tool for the rewarding of excellence is the Government Employees Incentive Awards Act. My own opinion is that too few major awards are made in the Federal Government for outstanding scientific contributions and technical papers.

In looking at this symposium, I was very pleased to find that there will be recipients of awards and citations for excellence of papers presented here. I am sure that you will agree that recognition of this sort makes life just a little better, just a little bit more worthwhile for the people who have done the work. I know that Dr. Harold Brown, Director of Defense Research and Engineering, thinks enough of an award recipient to send a note of commendation when major awards are made.

I am also assured by the Civil Service Commission that it is possible to have a 2-track system in which a promotion is made up to the very highest level, without requiring supervisory or administrative responsibilities, on the basis of individual research effort. In looking about, I find relatively few examples, however, of this having happened.

Turning to the subject of training in Government laboratories, I think we have done as good a job in career development as non-governmental research units. But I believe a great opportunity still exists for Federal agencies to make the Federal Service more attractive by doing more in the continuing education field, and by using training opportunities to attract young scientists and to assist them in acquiring advanced skills.

The Government Employees' Training Act could be used more widely to send people away for a time to acquire training, and even assuring them the old rule of thumb limiting training to a maximum of one year in ten can be waived when necessary. I've been delighted to learn that the Department of Defense has agreed, in principle, to permit laboratories to make additional appointments to compensate for the temporary loss of manpower which results when outstanding personnel are permitted to participate in long term training. I hope that the plans are being assembled to adopt this procedure at an early date.

There are many things which can be done and I think there are many things which are being done to strengthen in-house laboratories. I know that Secretary Hawkins has been working hard to improve conditions in the laboratories and to help make the Army scientific establishment an even more productive system of laboratories than it has been in the past. . . .

Well, I have already said too much. Reverting to my beginning theme, I think the future depends to a very considerable extent on the Army laboratories—on the products coming out of the research and development organization now and the products which will come in the future. The President and the White House staff are keenly aware of the role of science in solving not only military but many of our other problems; you can remain assured of the strong support and interest in your work by the White House.

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***LESSON FROM ON OLD FOX.*** **The old fox had fleas. The fleas were a nuisance. To the river went the fox, with a piece of moss in his mouth. He backed his tail into the water. The fleas scrambled onto his hind-quarters. He backed further into the water. The fleas fled onto the moss. The fox let the moss go. Out of the river came the fox.** ***(From Dr. Siu's T-THOUGHTS.)***

## Former USARO Staff Officer Receives Legion of Merit

Outstanding services as a technical specialist in Life Sciences in the Executive Office of the President has earned a former U.S. Army Research Office staff member the Department of the Army Legion of Merit.

The honor came to Col James B. Hartgering in June when he retired from the Army to accept a position as director of research for the American Hospital Association in Chicago, Ill. In 1959–60 he was chief, Medical and Biological Sciences Branch, Life Sciences Division, Army Research Office.

Upon the occasion of his assignment to the staff of the Special Assistant to the President for Science and Technology, at that time Dr. Jerome B. Wiesner, Col Hartgering was cited for outstanding service during his Army Research office duty.

Maj Gen A. L. Tynes, commanding general of Walter Reed Army Medical Center, presented Col Hartgering the Legion of Merit on behalf of President Lyndon B. Johnson. The program under which the colonel was assigned to the White House staff is under Walter Reed sponsorship.

Brig Gen Robert E. Blount, director of Research and Development, Office of The Army Surgeon General, paid tribute to Col Hartgering during the presentation ceremony, saying:

LEGION OF MERIT is awarded to Col Richard B. Hartgering by Maj Gen A. L. Tynes. At left are Brig Gen Robert E. Blount and Mrs. Hartgering.

"In his position at the White House since January 1961, Col Hartgering has been instrumental in the utilization of medicine as an instrument of national policy, particularly in this country's approach to the problems of emerging nations. . . ."

### Attention AE, R&D Specialists!!!

**To assure timely receipt of the *Army Research and Development Newsmagazine*, officers in the Atomic Energy and Research and Development Specialists Program should send notice of change of address to: Chief, Scientific and Technical Section, Sp. Br., ECP, OPD, OPO, DA, Washington, D.C. 20310.**

## Natick Woman Scientist Turns to Practice of Law

Professional versatility has recently cost the Army's Natick (Mass.) Laboratories a valuable employee.

Doris B. Robinson, a textile technologist with a premedical background who attended evening classes to study law, left her laboratory work to devote full time to legal practice. She was awarded a Certificate of Commendation by her former division director, Dr. Stephen J. Kennedy, and Dr. Dale H. Sieling, scientific director at Natick.

In 1956, Miss Robinson arrived at Natick to work in the Clothing and Organic Materials Division after being employed in cancer research at the Massachusetts Memorial Hospital in Boston. She received her LL.B. in January 1963 from Suffolk University in Boston.

Miss Robinson plans to specialize in child welfare work. She graduated from Howard University, Washington, D.C., after enrolling in a premedical course which led to a B.S. degree in biology and chemistry. She also attended Catholic University in the Nation's capital, and did graduate work at Fordham University.

She entered Government service in the Adjutant General's Office, Washington, D.C., and soon after joined the Philadelphia Quartermaster Depot where she was assigned to laboratory testing of textiles.

TEXTILE TECHNOLOGIST Doris B. Robinson receives Certificate of Commendation from Dr. Stephen J. Kennedy, director, Clothing and Organic Materials Division (right), and Dr. Dale H. Sieling, scientific director, Natick (Mass.) Laboratories.

## Newsmagazine Flub Stirs Naval Propellant Plant to Propose Integrated Effort

Omission of a single word in an article appearing in the February 1964 edition of this publication rightfully aroused the ire of the U.S. Navy, but has resulted in more effective inter-service cooperation.

A June 12 letter from the U.S. Naval Propellant Plant at Indian Head, Md., took exception to the statement in the February Newsmagazine, page 31, under the heading of "Some Picatinny Arsenal Men Get Paid to 'See Red,'" that the Arsenal was "the only United States organization which conducts such a safety program. . . ." The word Army, it is regretted, should have followed U.S.

The letter informed the editor that the Naval Propellant Plant has been designated as "field manager and coordinating agency by the Bureau of Naval Weapons for the development and implementation of a revised [propellants safety] surveillance program."

That recent action was taken by the Bureau of Naval Weapons. Further, the letter stated that "approximately 8,000 indexes, representing many compositions and granulation of smokeless propellants still in use, are under continuous surveillance."

Finally, the letter said: "With a view toward effecting further economies in the program, personnel in Picatinny Arsenal's Stability Testing Unit were recently contacted and information exchanged on the surveillance programs in operation at the two activities. It is believed that continued cooperation along these lines will be mutually beneficial to both Services, not only in cost reduction aspects, but also in the yield of scientific information."

# Kudos

Civilian Employee Incentive Awards Program presentations to three White Sands (N. Mex.) Missile Range employees recently gave them more than $1,500.

Highest individual award of $1,000 went to Russell L. Mertens, digital computer programer with the Range Operations Directorate. His idea for establishing a computer programed magnetic tape library inventory system resulted in tangible savings of almost $74,000 to the Government.

The award was presented by Maj Gen J. Frederick Thorlin, White Sands Missile Range commanding general.

Wilber J. Jarvis, an electronic development technician, suggested a replacement idea for radar beacons which resulted in savings to the Government of $8,000 and earned him a $405 award.

Ambrosio S. Lucero, a truck driver for Consolidated Supply Division, received an award of $120 for devising an improved method of blocking explosives on trailer beds.

An Outstanding Performance Award went to Lawrence B. Porter, visual information specialist for management data presentation. He was cited for efforts "which have far exceeded normal expectations."

Maj Gen John G. Zierdt, commanding general of the U.S. Army Missile Command, Redstone Arsenal, Ala., praised 12 Redstone engineers and scientists recently for what he called "significant contributions to the various Missile Command programs."

William V. Gudaitis, deputy director of the Inertial Guidance and Control Laboratory, was given the Meritorious Civilian Service Award—second highest award authorized by the Department of the Army. The honor was accorded him for his exceptional ability in organizing and directing the guidance and control research program.

Scientific and Engineering Achievement Awards were presented to Eugene A. Palm and William Strickland, both of the Propulsion Laboratory of the Research and Development Directorate, and Dr. Bernard Steverding of the Physical Sciences Laboratory.

Group awards for scientific and engineering achievements rewarded Roland L. Guard and Gilbert A. Penny of the Procurement and Production Directorate for developmental work on a new engineering data system, the EDS–0009.

Other award recipients included William B. McKnight, William F. Otto, James R. Dearman and Ralph W. Hawkins, all of the Electromagnetics Lab, for R&D work in the field of Lasers.

John McDaniel, acting director, and Harry Vincent, project director of the Directorate of Research and Development, were presented Outstanding Performance Awards.

Howard G. Lasser, a chemical engineer at the Engineer Research and Development Laboratories, Fort Belvoir, Va., was honored by the National Association of Corrosion Engineers. He became the first employee at the Laboratories to be certified as a qualified corrosion engineer, and one of the first in the metropolitan Washington, D.C., area to receive such certification. Among other qualifications, a selectee must be a registered engineer and have at least five years experience in the specialized field of metallic and nonmetallic coatings. Lasser has been associated with the Laboratories since 1951.

A Certificate of Achievement for meritorious service while assigned to the U.S. Army Engineer School, Fort Belvoir, Va., was presented to 1st Lt Thomas Charles Hager. He was cited for work as chief of the Environmental Equipment Branch, Missile Support Division, U.S. Army Engineer R&D Laboratories.

Sfc Nils G. Nilsson, a veteran of more than 20 years of service with the U.S. Army, was cited recently for his work at the U.S. Army Engineer R&D Laboratories.

The Certificate of Achievement cited his exceptional performance of duties with the Management Branch in conducting a survey of building utilization that will determine future allocation of space to units of the Laboratories and various tenant agencies.

A Special Act and Service Award of $100 was presented to Swante B. Swenson, also of the Engineer R&D Labs, for authoring an article, "Buildings in Barrels, Part II," published in Proceedings of the Technical Conference, Society of the Plastics Industry.

Albert Zupan received an initial award of $50 for disclosure of a patent application for a Thermal Liquid Level Control Switch. He will be eligible for an additional monetary award if the patent is granted.

Dr. Robert S. Wiseman and Mrs. Helen Z. Miller received both Outstanding Performance Ratings (OPR) and Quality Salary Increases (QSI) awards. Dr. Wiseman was cited as chief of the Warfare Vision Branch and Mrs. Miller as secretary in the Technical Services Department.

**Theresa S. Yamazaki and Maj Gen Chester W. Clark, CG, U.S. Army Japan, discuss two DA awards presented to her for services while serving as secretary to the chief, Human Factors and Operations Division, Office of the Chief of Research and Development (OCRD). General Clark presented the awards (an outstanding performance certificate and a certificate of achievement, signed by CRD Lt Gen William W. Dick, Jr.) during recent ceremonies at Camp Zama, Japan. Mrs. Yamazaki is currently working as secretary to General Clark.**

**J. Thomas Blair, a lieutenant colonel and commanding officer of the 5001st Army Reserve R&D Unit, won distinction as outstanding student in a recent 3-month Army Supply Management Course at Fort Lee, Va. A systems management officer at the U.S. Army Mobility Command (MOCOM) Hq., Warren, Mich., Blair was awarded a plaque by Assistant Secretary of the Army (Financial Management) Edmunt T. Pratt, Jr., and a diploma by Maj Gen Alden K. Sibley (pictured above), MOCOM commanding general.**

## Speak Gently, Let Thy Voice be Low. . .

# Edgewood Arsenal Librarian Leaves Memorable Mark

Little did Miss Alice M. Amoss, then a school teacher, suspect when she accepted a temporary summer job at the U.S. Army Edgewood (Md.) Arsenal, in 1918, that she would retire there at the age of 70 as an honored employee whose personality has left a cherished if not indelible imprint.

Forty-odd years in one job is a long time to build a reputation, but Miss Amoss built more than that. The U.S. Army Chemical Research and Development Laboratories technical library, one of the finest of its kind in the Department of the Army, is a continuing tribute to her guiding spirit as director.

A part of that spirit is evidenced by a sign she hung in the library too many years ago for most Edgewood users to remember but which continues to occupy its honored place and probably will for years to come —"Speak gently and let thy voice be low." On occasion, let it be whispered, Miss Amoss could effectively voice her sentiments in a somewhat more dramatic manner.

Part of that spirit also is deeply ingrained in "You are only as old as you feel," because at 70, she has plans to use to good professional advantage the B.S. degree in life sciences she received from McCoy College at Johns Hopkins University, Baltimore, Md., on June 9, 1964. As described by one of her Edgewood colleagues, "at 70 she's still vigorous, vibrant, a real personality."

Further proof of her convictions about age having little to do with enthusiasm was evidenced not too long ago when she visited the "Enchanted Forest" near Baltimore, normally a habitat for children and parents, and accepted a challenge to venture down the 60-foot slide.

Friends say her personality is "well weathered," a statement that applied also to the 1948 Chevrolet she "retired" about simultaneously with her recent retirement at Edgewood.

When Miss Amoss took control of the Edgewood technical library in 1923, some scientists with a flair for strong expression, referred to it as "the bat cave"—a term that lingered for long years. In 1925 she returned to her first love, teaching, for a year in Baltimore but the challenge of the cave was too strong to resist.

Since then, under her leadership, the library has become what users call "an integral part of the installation's research and development program." In early years confined largely to reports, books and other reference material on chemistry, the library now contains masses of information in such fields as atomic energy, biology, engineering, general technology, medicine, military science and physics.

**Brig Gen Fred J. Delmore, CG, Edgewood Arsenal, presents Alice M. Amoss with Letter of Appreciation and gold lifetime visiting pass to CRDL for her dedication to duties, profession, and principles as chief, technical library.**

Particularly valuable to research personnel are the long "runs" of outstanding chemical journals and extensive files of basic technical reference works. The collection includes some 329,000 individual technical reports, 48,000 bound volumes, 800 current journals, and an industrial literature file representing more than 10,000 commercial houses. Each year about 12,000 individual reports and 1,600 selected books are received.

To keep pace with the heavy flow of information. Miss Amoss inaugurated a program which includes the deep indexing of technical reference material and supervised the installation of machine methods for information handling. She has also actively cooperated in monitoring a conversion contract for mechanized storage and retrieval of technical data.

One of the many recognitions the library has received under the guidance of Miss Amoss for professional competence was selection in 1964 as one of eight technical libraries in the country to set up an exhibit at the Pentagon in Washington, D. C., during National Library Week. Many observers acclaimed it as the outstanding exhibit.

The occasion of Miss Amoss' retirement prompted Chemical R&D Laboratories leaders, scientists and technicians to honor her at a luncheon May 27 in the Edgewood Officers Open Mess. Brig Gen Fred J. Delmore, Edgewood CG, commended her for her lifelong devotion to her principles as chief of the technical library, gave her a Letter of Appreciation, and bestowed her with a lifetime pass to the installation.

Personnel in the Laboratories took up a collection and commissioned an artist to paint a large portrait of Miss Amoss. It will be displayed prominently in the library—not too far from the sign, "Speak gently and let thy voice be low."

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***TASTE-MAKING.*** **Breaking new trails in research is like taste-making in art. The greatest difficulty is not in pioneering a new path, but in leaving that new path to open up still another. "The trouble with taste-making," says Frank Getlein in *Horizon Magazine* (July 1962), "is that once a taste is made, there is a substantial investment in it—an investment of reputation, of intellectual interest, and of cash."**

# ERDL Generator Researcher Gets Scientific Achievement Award

The Scientific Achievement Award made annually by the U.S. Army Mobility Command's Engineer Research and Development Laboratories' Branch of the Scientific Research Society of America was presented recently to Adam Frank Renner.

Presentation of the award highlighted the Branch's annual banquet, held at the Fort Belvoir (Va.) Officers Club.

Renner was recognized for research in physics and electrical engineering and, particularly, magnetohydrodynamic pulse power generators. Research on this type generator appears to offer possibilities for generating large amounts of power from a very compact package at efficiencies approaching 50 percent.

Col J. H. Kerkering, commanding officer of the Laboratories, presented the award to Renner, employed in the Electrical Power Branch.

**Adam Frank Renner**

### In Military, As Ever, It's by the Numbers. . .

# But Arabic System Made No Sense to Romans

Current emphasis in Federal Government activities on new systems, the marvels of modern mathematics, and computer capabilities to solve many of man's complex problems—with the attendant controversy over concepts—merits an appreciation of the following, reprinted from "Simplified Chemical Coding for Automatic Sorting and Printing Machinery."

Many years ago a Roman civil engineer, who was a high official in Alexandria, was approached by a young Arabian mathematician with an idea which the Easterner believed would be of much value to the Roman Government in their road-building, navigating, tax-collecting, and census-taking activities. As the Arabian explained in his manuscript, he had discovered a new type of notation for number writing, which was inspired from some Hindu inscriptions.

The Roman official presumably studied this manuscript very carefully for several hours, then wrote the following reply:

Your courier brought your proposal at a time when my duties were light, so fortunately I have had the opportunity to study it carefully, and am glad to be able to submit these detailed comments.

Your new notation may have a number of merits, as you claim, but it is doubtful whether it ever would be of any practical value to the Roman Empire. Even if authorized by the Emperor himself, as a proposal of this magnitude would have to be, it would be vigorously opposed by the populace, principally because those who had to use it would not sympathize with your radical ideas. Our scribes complain loudly that they have too many letters in the Roman Alphabet as it is, and now you propose these ten additional symbols of your number system, namely

1, 2, 3, 4, 5, 6, 7, 8, 9, and your 0.

It is clear that your 1-mark has the same meaning as our mark-I but since this mark-I already is a well-established character, why is there any need for yours?

Then you explain that last circle-mark, like our letter O, as representing "an empty column," or meaning nothing. If it means nothing, what is the purpose of writing it? I cannot see that it is serving any useful purpose; but to make sure, I asked my assistant to read this section, and he drew the same conclusion.

You say the number 01 means the same as just 1. This is an intolerable ambiguity and could not be permitted in any legal Roman documents. Your notation has other ambiguities which seem even worse: You explain that the mark-1 means ONE, yet on the very same page you show it to mean TEN in 10, and one HUNDRED in your 100. If my official duties had not been light while reading this, I would have stopped here; you must realize that examiners will not pay much attention to material containing such obvious errors.

Further on, you claim that your system of enumeration is much simpler than with Roman Numerals. I regret to advise that I have examined this point very carefully and must conclude otherwise. For example, counting up to FIVE, you require *five* new symbols whereas we Romans accomplish this with just *two* old ones, the mark-I and the mark-V. At first sight the combination IV (meaning ONE before FIVE) for four may seem less direct than the old IIII, but note that this alert representation involves LESS EFFORT, and that gain is the conquering principle of the Empire.

Counting up to twenty (the commonest counting range among the populace), you require ten symbols whereas we now need but three; the I, V, and X. Note particularly the pictorial suggestiveness of the V as half of the X. Moreover, it is pictorially evident that XX means ten-and-ten, and this seems much preferred over your 20. These pictorial associations are very important to the lower classes, for as the African says, "Picture tells thousand words."

You claim that your numbers as a whole are briefer than the Roman Numerals, but this is not made evident in your proofs. Even if true, it is doubtful that this would mean much to the welfare of the Empire, since numbers account for only a small fraction of the written records; and in any case, there are plenty of slaves with plenty of time to do this work.

When you attempt to show that you can manipulate these numbers much more readily than Roman Numerals, your explanations are particularly bad and obscure. For example, you show in one addition that 2 and 3 equal 5, yet in the case which you write as: 79 this indicates that

& 16

95

9 and 6 also equals 5. How can this be? While that is not clear, it is evident that the other part is in error, for 7and 1 equal 8, not 9.

Your so-called "repeating and dividing" tables also require much more explanation, and possibly correction of errors. I can see that your "Nine Times" Table gives sets which add up to nine, namely

18 27 36 45 54 63 72 81 and 90

but I see no such useful correlation in the "Seven Times" table, for example. Since we have SEVEN, not, nine, days in the Roman Week, it seems far more important we have a system that gives more sensible combinations in this table.

All in all, I would advise you to forget this overly ambitious proposal, return to your sand piles, and leave the numbering reckoning to the official Census Takers and Tax Collectors. I am sure that they give these matters a great deal more thought than you or I can.

## ERDL Testing Smallest Unit Of Turbine Generator Group

A 15 kw. turbine-driven generator set, much more compact than a diesel set of equal rating, is being tested by the U.S. Army Mobility Command's Engineer Research and Development Laboratories, Fort Belvoir, Va.

The prototype set weighs 350 pounds and is 18″ wide x 24″ high x 40″ long, compared to approximately 2200 pounds and dimensions of 29″ x 45″ x 68″ for a 15 kw. diesel set.

Designed for multi-purpose use, the new unit is designed to power front-line communications systems, radar systems, air traffic control systems and missile systems.

Other units of the gas turbine generator family include the 30, 45, 60, 100 and 150 kw. sets. All are designed for ease of maintenance and are capable of providing precise power under extreme climatic conditions.

### TRECOM Commander Promoted

Col Michael J. Strok, commander, U.S. Army Transportation Research Command, was promoted to that rank, June 10 in ceremonies conducted by Maj Gen John J. Lane, commanding general of Fort Eustis, Va.

A Senior Army Aviator, he has been flying for the Army since 1942 and is qualified for both helicopters and fixed wing aircraft. He is a graduate of Cornell University and has attended the Army War College at Carlisle Barracks, Pa.; the Command and General Staff College at Fort Leavenworth, Kan., and other service schools.


## Contract Let on Development of Jet-Boosted UH-2

A research contract to add wings to a jet-augmented UH-2 helicopter has been awarded to Kaman Aircraft by the U.S. Army Transportation Research Command (USATRECOM), Fort Eustis, Va.

Colonel Michael Strok, USATRECOM commander, said the UH-2 research helicopter has been flight tested with an auxiliary YJ-85 GE jet engine to investigate high-speed flight, and will be further modified by the addition of wings to extend the high-speed test program.

Paul J. Carpenter, chief of TRECOM's Advanced Aeronautical Engineering Group, noted that the jet-augmented UH-2 has repeatedly achieved true air speeds of over 200 m.p.h. in the flight test program.

Results of the first phase of the program encourage the Kaman Co. and Army engineers to believe that the air potential of an augmented UH-2 is over 250 m.p.h.

The contract calls for further flight testing to begin in September and to be completed by the end of 1964. The flights will take place at Kaman's flight test facilities at Bloomfield, Conn.

USATRECOM recently transferred its surface materiel and functions to the Engineer R&D Laboratories at Fort Belvoir, Va., and is now the research agency for the Army Aviation Materiel Command, St. Louis, Mo.

## Squirt Tests Materials for Sprint Antimissile System

Squirt, a rocket three times faster than a rifle bullet, is being used to test materials for the Army's new Sprint antimissile missile.

Described by the Nike X Project Office at Redstone (Ala.) Arsenal as "a test bed for candidate materials for Sprint," the 23-foot Squirt is being flown at White Sands (N. Mex.) Missile Range as part of the Nike X ICBM defense missile system development program.

Major function of Squirt is to find out more about aerothermal effect (air friction heating) encountered by missiles such as Sprint. Planned to intercept ICBMs at 17,000 m.p.h. after they have reentered the earth's atmosphere, Sprint is the highest acceleration guided missile being developed by the Army.

Squirt is being fired to test various construction and insulation materials on the nose cone of the test rocket. In designing the experiments, Martin Co., subcontractor, works closely with Bell Telephone Laboratories, responsible for design and development of the Nike X system.

The free-flight Squirt gets its boost from seven Recruit rocket motors. At burnout, the booster package falls away and the rocket gets an additional boost from seven Cherokee rockets. Both motors are manufactured by the Thiokol Chemical Corp.

A Nike Zeus system missile tracking radar at White Sands tracks the Squirt for data purposes.

**Developed to test materials for the Army's Sprint antimissile missile, Squirt is boosted by seven Recruit rocket motors during tests at WSMR.**

## AVCOM Contracts for 60 'Copter' Instrument Trainers

A $3,357,000 contract for the manufacture of 60 helicopter basic instrument trainers was awarded in June to Bell Helicopter Co. by the U.S. Army Aviation Materiel Command (AVCOM).

Col Howard F. Schiltz, AVCOM commander, announced the award as a result of the Army's first two-step, formally advertised aircraft procurement program. Three aircraft producers, of 21 solicited, submitted five aircraft under the first step, which included flight tests and evaluation by the Army Aviation Board, Fort Rucker, Ala.

Two firms competed in the final step, submitting firm, fixed-price bids on three aircraft, with the contract going to the low bidder.

The award is the result of multi-year buy procedures, under which today's contract is the first of two increments. The second increment, subject to funding authority in Fiscal Year 1965 (starting July 1, 1964), will be for 43 additional Bell 47G-3B-1's at a contract price of $2,405,-850. Total price for the 103 aircraft will be $5,762,850.

The contract provides for production of a 2-place civilian off-the-shelf aircraft. Widely used in industry, it is much the same as the OH-13s which Bell builds for the Army. It is powered with a 270 h.p. Lycoming TVO-435 engine equipped with an AiResearch T-11 exhaust-driver supercharger, delivering normal power to above 15,000 feet. The two-bladed metal main rotor has a diameter of 37 feet. Cruising speed is 90 miles per hour, with a range of 260 miles.

### ERDL Commander Addresses Conference of Engineers

Col J. H. Kerkering, commanding officer of the U.S. Army Engineer R&D Laboratories, Fort Belvoir, Va., was a guest speaker at the recent annual meeting of the Society of American Engineers in Washington.

His subject was "Engineering Equipment for Tomorrow's Construction." Col Kerkering, CO of the Labs since 1960, is a graduate of the U.S. Military Academy, the Engineer School, Command and General Staff College, Army War College and holds a master's degree in civil engineering from Massachusetts Institute of Technology. He is a registered professional engineer in Illinois.

# Missile Command Elevates Quality, Reliability Elements

A new staff office has been organized at the U.S. Army Missile Command, Redstone Arsenal, Ala.—the Quality and Reliabiliy Management Office. It has the task of assuring that all missile and rocket materiel conforms to the requirements of the user and that the product will perform satisfactorily.

Headed by Kenneth E. Joy, former chief of the Quality Assurance Division, the new office is a combination of the Quality Assurance Division and the Reliability Branch.

"We can give the many missile systems much greater program continuity," Joy said, "and we now have a central point of contact relating to all quality and reliability policies. All echelons of the Missile Command will be provided with timely appraisals of quality and reliability data which will be suitable for all levels of management in making major program determinations and decisions."

Three major divisions comprise the new office. Miles R. Hardenburgh heads the Requirements and Policies Division, James E. Holt the Program Review and Evaluation Division and Robert O. Black the Systems Assessment Division. Joy's special assistant is William T. Anderson.

Importance of the new office was indicated when more than 300 missile prime and subcontractors convened at Redstone Arsenal June 23 for the first of a series of Zero Defects seminars planned for defense establishments throughout the country.

Kenneth E. Joy

The Department of Defense-sponsored program is designed to raise both military and industry performance standards to a "no defect level."

"Pride of workmanship," a Department of Defense spokesman said, "is an inherent characteristic of the American worker, regardless of his position or area of responsibility. The Zero Defects program will afford him an opportunity to exhibit this characteristic in his work."

# *Redstone Arsenal's Ph.D. Group Swelled by 4*

Four scientists in the U.S. Army Missile Command Physical Sciences Laboratory, Redstone Arsenal, Ala., recently received Ph.D. degrees.

The new doctors are John P. Hallowes, Jr., director of the Physical Sciences Laboratory, and three of his staff scientists, Alfred C. Daniel, a solid-state research physicist, Dale R. Koehler, research nuclear physicist, and Billy B. Letson, research physical chemist.

Dr. Hallowes received his Ph.D. from Vanderbilt University, Nashville, Tenn., and his three staffers received theirs from the University of Alabama.

Dr. Hallowes admits it is rare for four scientists in a single Army laboratory to receive doctorate degrees at one time but commented that out of a scientific and engineering staff of about 50, 15 now hold doctorates.

After earning a B.S. degree in electrical engineering from Georgia Tech, Dr. Hallowes began work at Redstone Arsenal in 1951. Dr. Daniel earned B.S. and M.S. degrees in electrical engineering at Georgia Tech and began employment with the Missile Command in 1958.

Dr. Koehler holds B.S. and M.S. degrees in engineering physics from Auburn University and has worked on Missile Command projects since 1957. Dr. Letson is in his freshman year as a Missile Command employee after receiving B.S. and master's degrees in engineering from Alabama.

Daniel, Koehler and Hallowes participated in the Army's graduate study program and Letson finished his doctorate work under his own sponsorship.

**Four scientists in the U.S. Army Missile Command's Physical Sciences Laborator received their doctorate degrees recently at the same time. Left to right, they are Dale R. Koehler, John P. Hallowes, Jr., who is director of the laboratory, Alfred C. Daniel and Billy B. Letson.**

## ERDL Deputy CO Assigned To Cold Regions R&E Lab

Assignment of Col Philip G. Krueger as commanding officer of the U.S. Army Materiel Command's Cold Regions Research Engineering Laboratory (CRREL) at Hanover, N.H., will take effect this month.

For the past two years he has served as deputy commander of the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va. His new assignment is concerned with CRREL's mission of amassing and evaluating worldwide arctic research results to enhance the U.S. Army's capability of combat and operations in the frigid regions.

Graduated from the U.S. Military Academy at West Point, N.Y., in 1942, Col Krueger earned a master's degree from Cornell University. He has completed courses at the Armed Forces Staff College, Norfolk, Va., and Air War College, Maxwell, Ala.

Major military assignments have included: area engineer and deputy district engineer, Trans-East District, Pakistan; instructor, Command and General Staff College, Fort Leavenworth, Kans.; commanding officer, 13th Engineer Battalion in Korea; Atomic Energy Commission and Armed Forces Special Weapons Project, 1946-1948 and 1950-54. During World War II, he served in Europe with the 40th Engineer Group.

# Missile Command Announces Nike Hercules Program Head

Twenty-four years of Army service back the credentials of the new project manager for the Army's Nike Hercules air defense missile system at the Army Missile Command, Redstone Arsenal, Ala.

Col Rawlins M. Colquitt, Jr., a native of Houston, Tex., and a graduate of Texas A&M College, heads one of the Missile Command's biggest programs. The Hercules is currently the Army's primary defense against high-altitude aircraft.

The Project Office has the responsibility for development of improvements to the system as well as supporting Nike sites located throughout the United States and a number of Allied countries.

Col Colquitt's previous assignment at Second Army Headquarters, Fort George G. Meade, Md., was chief of the Plans and Operations Division, Office of the Deputy Chief of Staff, Logistics. For his service in that capacity, he received a second Army Certificate of Achievement.

Born in Houston, Tex., in 1915, he entered active duty with the Army as a second lieutenant in July 1940. He served with the 51st Anti-Aircraft Artillery Brigade in Europe during World War II. Subsequently he served with AAA units in the United States, Europe and Korea.

A graduate of the Armed Forces Staff College and the Army War College, he has been awarded the Bronze Star Medal, Army Commendation Medal and the Croix de Guerre.

# Col Overholt Wins 'A' Award Recognizing Medical Skills

The coveted "A" prefix for professional superiority in his specialty of internal medicine was awarded to Col Edwin L. Overholt in June 17 ceremonies at Walter Reed General Hospital, Washington, D.C.

Assistant chief of the Department of Medicine and chief of General Medical Services, he was recognized for "continued demonstration of exceptional professional ability." The award was presented by Col Fred C. Hughes, chief of Professional Services, OTSG.

Criteria for selection as recipient of the "A" prefix include a very dependable degree of clinical maturity and medical resourcefulness, technical skill, and the approbation of both colleagues and patients.

Col Overholt was graduated from Franklin and Marshall College, Lancaster, Pa., in 1945 with a science degree and received an M.D. degree from the State University of Iowa at Iowa City in 1948. He served in the U.S. Navy from December 1942 to 1947 and entered Army service in 1948.

Recipient of the Silver Star in 1951 for duty in Korea, he has served in both the European and Far East Commands as well as at Stateside posts during his 16-year Army career. He is a member of the American College of Physicians and an associate editor of Medical Annals of Washington, D.C.

Col Overholt will report this month to Fitzsimons General Hospital, Denver, Colo., to serve as chief of the Department of Medicine.

# Missile Command Opens Drive in DoD Zero Defects Program

Zero Defects—the Defense Department's new program to raise quality standards throughout the defense industry—was the theme of an all-day seminar June 23 sponsored by the U.S. Army Missile Command at Redstone Arsenal, Ala.

More than 300 missile prime and subcontractors attended the first in a series of seminars sponsored by the Department of Defense. The Missile Command, under the direction of Maj Gen John G. Zierdt, is the first military agency to hoist a Zero Defects Seminar following DoD's adoption of the program.

The program has been in effect at the Missile Command for the past year. In addition to General Zierdt, who gave the keynote address, prominent Government, military and industrial personnel appeared on the program.

Top DoD official at the Seminar was George E. Fouch, Deputy Assistant Secretary of Defense (Equipment Maintenance and Readiness).

Speakers included G. T. Willey, vice president and general manager, Orlando Division, Martin Co.; E. Woll, general manager, Flight Propulsion Division of General Electric; F. W. O'Green, president, Guidance and Control Systems Division, Litton Industries; Brig Gen John A. Goshorn, director of procurement, Office of the Assistant Secretary of the Army (Installations and Logistics), and K. E. Joy and Miles R. Hardenburgh, both with the Missile Command's Quality and Reliability Management Office.

# Sergeant Missile Units Slate Practice Firings in Hebrides

Sergeant Missile Battalions of the U.S. Army, Europe, will conduct routine practice firings this summer on the British range in the Hebrides, the U.S. Department of Defense and British Ministry of Defense jointly announced June 5.

The Hebrides are a group of sparsely settled islands off the northwestern coast of Scotland.

The arrangement is in accordance with the North Atlantic Treaty Organization practice that a NATO country should make available to others in the alliance, if possible, any extra capacity on its firing ranges. The British Army also will provide certain equipment and support personnel.

Use of the Hebrides Range will provide an excellent training exercise for support personnel as well as personnel in the missile units themselves, a U.S. spokesman said. The arrangement also is in line with the current DoD economy program. Sergeant units otherwise would have to return to the U.S. for firings.

The U.S. Army, Europe's Sergeant Missile Units will be airlifted one at a time to the Hebrides Range. Firings will take place in July and August.

## Dr. Weigle Attends NATO Meet

Dr. Robert E. Weigle, chief scientist, Watervliet Arsenal, U.S. Army Weapons Command, represented the United States in a NATO arms conference in Paris, June 13-22.

Dr. Weigle was the U.S. representative in the group of NATO nation experts who exchanged information of potential benefit to each other on materials and manufacturing techniques for weapons and ammunition.

## AMC Group Discusses Weapons

Fifteen members from all major subcommands of the U.S. Army Materiel Command met recently at Redstone Arsenal, Ala., to discuss ways to promote improved effectiveness of weapon systems.

Known as the Technical Working Group "Design Coupling," the new organization represents leading design specialists of AMC agencies actively engaged in Army material design. H. A. Heithecker, deputy director of the Structures and Mechanics Laboratory of the U.S. Army Missile Command's Research and Development Directorate, heads the unit.

# Army Contractor Studies Military Implications of Global Flight Fatigue

A business or military executive flying from New York to Rome may become not only tired from his trip but also topsy-turvy metabolically.

Preliminary studies show that when he has flown rapidly through a number of time zones, and suddenly night is day, his normal bodily processes must adjust to a schedule which amounts to an about face.

Rapid transport through multiple time zones and the effect it has physiologically and psychologically, in view of the increasing requirement for aerial movement of large forces of combat soldiers, is now being studied in depth under a contract awarded recently by the U.S. Army Research Office, Office of the Chief of Research and Development.

Various airlines and business firms have already made some studies of performance of executives after traveling halfway around the world and soon thereafter going into a normal day of business.

As an example, consider the businessman who boards a flight for Rome in New York. Not wanting to waste a working day, he decides to take the 7:30 p.m. flight. He has a leisurely dinner. It's 9 p.m. Too early to go to sleep. He reads for an hour and a half and begins to doze.

The stewardess shakes him and says, "We are about to land in Rome, sir." He looks out the window of the jetliner and blinks groggily in the dazzling brilliance of the Italian sunlight. The stewardess says over the intercom, "Please set your watches. Is is now 10:15 a.m. in Rome."

The executive yawns. He has an important conference at 11:30 and feels like yesterday's laundry. By New York time, to which his bodily processes are firmly adjusted, it is just past midnight and he has had only two hours sleep but the Romans have been going strong for hours.

Often it may take several days for this man to adjust metabolically to the new life cycle. He will be eating lunch at 3 a.m. New York time, dinner when he normally would be beginning his work day, and trying to sleep about the time of his usual afternoon coffee break. By the time he is finally adjusted, he may have to fly back to New York and adjust all over again.

U.S. busines firm leaders and military officials in the Pentagon, Washington, D.C., have indicated doubt in the wisdom of requiring an executive to report to a conference soon after landing from a flight through a number of time zones. When alertness for major decisions is required, earlier flight scheduling is being tried to eliminate the need for a too-rapid time adjustment.

A battle, however, could hardly be postponed for a day. Neither could troops always be flown into an area a day in advance of anticipated combat to allow them time to adjust to metabolic confusion.

This problem is the stimulus for the Army Research Office contract with the Life Sciences Research Office, Federation of American Societies for Experimental Biology, Bethesda, Md., to conduct a study of "Military Implications of the Rapid Transport of Troops Through Multiple Time Zones by Air."

The realistic presumption is that if the businessman on the New York-Rome flight has trouble carrying on normal activity after jumping halfway around the world, combat troops will have an even tougher time pitching into battle, unless knowledge to facilitate adjustment is acquired.

Objectives of the study will be:

- To evaluate present knowledge of the impact upon performance of men who have been rapidly transported through several time zones.
- To summarize the existing scanty information on the nature of the metabolic disturbances, fatigue effects, muscular and vascular changes and intellectual impairments that follow rapid movement of men through a significant arc of the earth's surface.
- To make recommendations, on the basis of a scientific analysis of the problems, to minimize troop performance impairment caused by rapid transport through multiple time zones.
- To determine whether the biological rhythms of men are equally sensitive to rapid transport through multiple longitudes as compared to equal distances latitudinally.
- To make recommendations for future research in this field pertinent to the Army's needs.

The ARO requirement to FASEB describes in detail the scope of the study. Some of the factors involved are biological rhythm disruptions, extremes of muscular rest, circulatory impairment, lowered oxygen partial pressure, prolonged vibration and noise.

The review will attempt to assess the significance of many poorly defined factors such as magnetic and electric fields, lunar gravitation, barometric pressure and atmospheric ion count.

Travel from north to south does not involve the jump over numerous time zones like those from west to east or east to west. It would be of interest to determine the comparative effects of such directional travel.

The requirement points out that jet fatigue has been described by many travelers and the effects seem very real but the evidence has not been documented. Among questions it asks are:

What are the origins of the recommendations that executives, ranking admirals and generals refrain from participating in scheduled conferences inspections and vital briefings soon after landing from long transoceanic flights? Are these recommendations valid?

An important consideration is the long-range Army plan of troop transport by plane at supersonic speeds. The maximum time for supersonic air transport by plane anywhere in the world will be considerably less than for subsonic transport. In this case, the study requirement asks if the time zone-biological rhythm disruptions would be less important. Fatigue of an entirely different quality may be encountered when transportation of troops reaches this stage.

Another factor in flying is that even though the cabins of planes are pressurized, a propeller-driven airplane cruises at 20,000 feet with a cabin altitude of 9,700 feet. Consequently, when the plane lands at roughly sea level, the occupants have another adjustment to make.

Another Army Research Office study is considering the effects on humans when they are transported to a much higher altitude.

Both study contracts recognize the necessity and value of research on biological factors in order to learn how to increase the effectiveness and adaptability of a modern Army and its indispensable element—the soldier.

### Chemical Engineers to Convene

The Chemical Institute of Canada will sponsor the 14th Chemical Engineering Conference in Hamilton, Ontario, Oct. 26-28.

The overall theme is process engineering and various symposia will be concerned with corrosion, chemical reactor design, high temperature processes, non-Newtonian fluid behavior, transport phenomena in two-phase flows, separation processes, machine simulation in chemical engineering and applied statistics.

# FLEEP Passes Flight Tests at Yuma Site

Flight tests of the U.S. Army XV-8A "FLEEP," a unique aerial vehicle being evaluated as a short takeoff and landing (STOL) utility craft for possible use in remote areas, were completed in June, three weeks ahead of schedule.

Built for the Army by Ryan Aeronautical Co., the vehicle is one of three experimental projects to develop the flexible wing concept for airdrop deliveries. The others are the Air Cargo Glider and the Precision Drop Glider that recently passed field research tests in Southeast Asia.

H. C. Cotton, Ryan Aeronautical Co. test pilot, flew the FLEEP during the test program conducted at the Army's Yuma (Ariz.) Proving Grounds. Following the 2-month Ryan test program, Duane Simon, research test pilot from the U.S. Army Transportation Research Command at Fort Eustis, Va., flew the aircraft to evaluate performance characteristics.

U.S. Army XV–8A FLEEP

A former Army aviator with experience in helicopters and fixed-wing aircraft, Simon was impressed by the short field landing performance of the FLEEP and said it is so simple to operate that inexperienced pilots with limited flight experience should learn to fly it readily.

James T. Matthews, deputy chief of TRECOM's Applied Aeronautical Engineering Group, reported that nearly 50 flights were made during the testing program. Several operations were made from rough unprepared desert surfaces away from the landing strip of the test facility.

Test flights included lifting large cargo boxes lashed to the platform between the pilot and the pusher engine with payloads of close to 1,000 pounds carried to an altitude of 9,500 feet.

Still considered a test vehicle, the FLEEP has no hydraulic, electrical, or starting system. Its fixed-pitch propeller is simpler and less costly than a controllable-pitch propeller.

In contrast with the conventional three controls of most fixed-wing aircraft, the FLEEP has been operated with only lateral and longitudinal controls. However, a rudder for directional control will be evaluated.

Further experimental work on all three of the flexible wing aircraft projects will be undertaken to verify potential as a manned or unmanned cargo delivery vehicle.

## 11th Air Assault Division Holds 2-Week Task Force Maneuver

Nearly 7,500 soldiers from the 11th Air Assault Division (Test) at Fort Benning moved into South Carolina June 15 to begin a 2-week exercise, HAWK STAR I, a Brigade Task Force maneuver designed to examine the Army's new air mobility concept.

One of the primary purposes of the exercise was to prepare soldiers of the Division for a full-scale exercise scheduled to be conducted by the Army in the fall.

Brig Gen John M. Wright, Jr., assistant division commander, was exercise director. Maj Gen C. W. G. Rich, commanding general of the Infantry Center at Fort Benning, was overall test director.

The 11th Air Assault Division (Test) was formed at Fort Benning, Ga., in February 1963, to test and further develop the Army's air mobility concept for ground combat. It was further supported in the exercise by the attached 10th Air Transport Brigade. The Division is commanded by Maj Gen Harry W. O. Kinnard, who has served since its inception.

## Dr. Weber Tours USAEPG, Hears Briefing on Laser R&D

U.S. Army Chief Scientific Adviser Dr. Harold C. Weber recently inspected elements of the U.S. Army Electronics Proving Ground, Fort Huachuca, Ariz. Briefed by Maj Gen Benjamin H. Pochyla, USAEPG commander, he toured the Electronic R&D Activity where special briefings were given on Laser research and development.

Dr. Weber is a recipient of the Presidential Certificate of Merit for work in the Defense Department during World War II and the Army Meritorious Civilian Service Award for outstanding contributions while serving as chairman of the Chemical Corps Advisory Committee.

Author of a textbook, *Thermodynamics for Chemical Engineers*, and numerous technical articles, he has been Army Chief Scientific Adviser since 1958.

## Plastic Aircraft Being Considered for Counterinsurgency

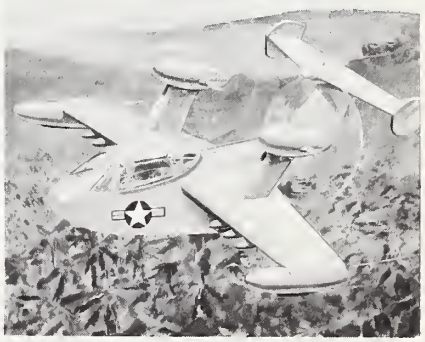
A proposal to build extremely small, all-plastic aircraft to meet military requirements for a counterinsurgency (COIN) airplane is being considered.

Believed to be the first comprehensively designed all-plastic military aircraft, the airplane designed and proposed by Goodyear Aerospace Corp., is amphibious and would be capable of operating from almost any type of terrain.

The concept has been submitted as an alternate to an all-metal aircraft proposed by other firms in a U.S. Navy competition. Goodyear Aerospace officials said they hope the concept will lead to a research and development program to prove the feasibility of an all-plastic aircraft.

Using two pusher-type propellers and engines mounted on pylons above the wing, the proposed COIN aircraft would resist corrosion and could be constructed in large, integrated components because of its fiberglass-reniforced plastic construction. Comprehensive wind tunnel tests of the concept, conducted on a model, are reported to have provided the desired performance when compared with conventional engine installations.

The airplane has a shoulder-height wing of low aspect ratio and a high tail at the end of a swept-up fuselage. The wings carry tip tanks, giving the craft a span of 23 feet, or less than two-thirds the span of the smallest military airplane currently in use.



**Artist's concept of proposed all-plastic airplane designed to meet military requirements for operation from almost any type of terrain.**

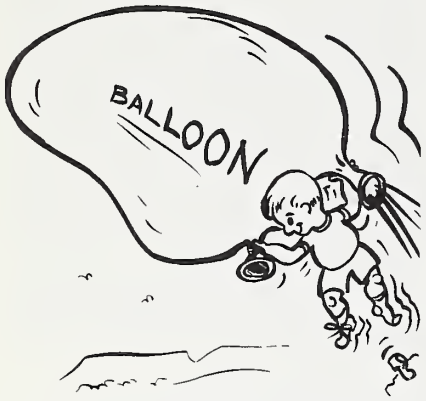
## You Might Learn From Junior, Daddy. . .

# How Balloon Power Applies to Guided Missiles

The mischievous child who lets an air-filled balloon flutter about the room is closer to the fine art of guiding missiles than his irate Papa may think.

The simplest principle used for decades by children to propel their erratic balloons is under study by experts at the Army Missile Command, Redstone Arsenal, Ala., for possible use in guiding some of tomorrow's advanced missiles.

Imagine for instance, that Junior's balloon was equipped with two exhaust nozzles, and that the amount of air spewing from each could be varied. Then Junior would have himself a balloon control system of sorts—remarkably like the one under development today by the Army's master craftsmen.




"We've come up with some very interesting results," stated William A. Griffith, who heads a team of control specialists in the Research and Development Directorate's Inertial Guidance and Control Laboratory. "Some of these results seem to have real possibilities."

While the notion of using short, powerful bursts of pressurized gas is nothing new to missile control technicians, he said, not a great deal of work has been done toward coming up with something usable—without a bewildering bundle of delicate moving parts and endless electrical apparatus.

In an age when things are sometimes measured by the complexity of gadgetry, the experiments point up a trend among the developers of Army missile hardware to place a premium on simplicity. If proved acceptable, the idea to control missiles with pure fluid flow systems having no moving parts would easily rank as the simplest, most economical and yet durable control technique in the Army's modern arsenal of arms.

Like most other techniques, it would have a certain number of drawbacks but, for the present, the idea seems peculiarly suited for controlling some of the Army's short- and medium-range missiles.

In the experimental program, a small, free-flight rocket is being modified for the first known flight to test the control technique some time this year. Called a pure fluid flow control system by engineers, the missile's control package will be unusually small when compared with present-day standards. These systems use streams of air, or gas, directed by tiny channeled plates carried inside the missile.

"By amplifying the gas pressure," Griffith explained, "we think we can perform a whole handful of complicated functions necessary to tell a missile the three things it must know —where it is; where it is going; and which way is straight up."

When the missile currently under modification is ready for flight, it will be fired on a test range at Redstone Arsenal. Initial tests will measure and control only the missile's rate of spin. Later tests are planned to control pitch, yaw, and possibly other things.

"Eventually, we hope to come up with a control system which will use gases created by the burning propellant," Griffith said. "But for the present, we're using compressed air carried in special little containers aboard the missile. If that goes as expected, the control technique possibly could be adapted for use in some of the Army's missile systems of the future."

## DoD Instruction Issued on Retraining RIF Personnel

Department of Defense Instruction 1430.9, issued June 10, outlines more effective utilization of retraining programs for career civilian employees left jobless by base closings and reductions in force.

The Instruction specifies that displaced employees will be retrained if their present skills prevent reassignment, but they must possess related skills or basic aptitudes which will enable retraining within a reasonable period of time.

Surplus employees also must agree to accept reassignments in locations where jobs are available. Primary responsibility for determining which employees need retraining rests upon the losing installation.

Both losing and gaining DoD installations must plan and conduct necessary retraining. Regional coordinators in each Military Department will serve as focal points for identifying positions which can be filled by retrained employees.

When suitable positions cannot be located within the DoD for which employees can be retrained, consideration will be given to the development of cooperative retraining programs with other Federal agencies in need of personnel and with State Employment Services under the Manpower Development and Retraining Act.

## DDC Reports to OTS Average About 80 Documents Per Day

**All unclassified, unlimited release technical documents now received by the Defense Documentation Center (DDC) are being processed by the Office of Technical Services (OTS) of the Department of Commerce. Currently, this input averages 80 documents a day.**

**DDC, which is one of the 12 Centers of the Defense Supply Agency, will continue to serve its requesters and receive documents to be added to the collection. OTS will process reports in the public domain, store them, announce them, reproduce them and fill requests for DDC. DDC will reimburse OTS for this service.**

## TRECOM Selects Leader Of Aeromechanics Group

John E. Yeates, aerospace engineer with the U.S. Army Transportation Research Command, Fort Eustis, Va., has been promoted to group leader, Aeromechanics Group.

From 1947 to 1958, he was employed at the National Advisory Committee for Aeronautics as an aeronautical research engineer. He served as project engineer on research projects which included helicopter vibration, high-speed aircraft buffeting and supersonic windtunnel studies.

Formerly a pilot in the U.S. Army Air Force (1941-46), his extensive experience in aviation is centered in dynamics and aerodynamics of rotary wing aircraft. He holds the Air Medal with two Oak Leaf Clusters and Presidential Unit Citation, is a member of the American Helicopter Society, and has authored several technical reports on helicopter vibration, aircraft buffeting and high-speed low-altitude gust loads.

## WRAIR Honors Major Charles Shields With Hoff Medal

The Hoff Medal, established in 1897 to honor the student with the best record in Military Medicine and Allied Sciences at Walter Reed Army Institute of Research, was awarded June 12 to Maj Charles E. Shields.

Twelve graduates of the 9-month course were awarded diplomas, others being Lt Cols Alexander M. Boysen and James D. Harvey, Majors John J. Castelott, Walter C. Gordon, Leon M. Hebertson, Philip R. Jacoby, Samuel C. Jefferson, Martin L. Nusynowitz, William P. Schane, Charles E. Shields and Arnold W. Siemsen, and Capt George N. Lewis, III.

Maj Shields will remain at WRAIR in the Division of Medicine. He earned his B.S. degree from Yale University in 1953, an M.D. from Columbia University College of Physicians and Surgeons in 1957, served his internship at Valley Forge Army Hospital, Phoenixville, Pa., and his residency at Tripler Army Hospital in Honolulu, Hawaii.

## New Mexico State U Presents WSMR CG Honorary Law Degree

Maj Gen J. Frederick Thorlin, commanding general of White Sands (N. Mex.) Missile Range, received an honorary doctor of laws degree June 6 from New Mexico State University.

The citation stated: "For outstanding achievements as administrator, educator and research director for the United States Army, resourceful and efficient leadership in the management of ordnance equipment, superior organizational ability in directing major operations in the missile and space program, and a distinguished career as a soldier, spanning nearly 31 years."

A graduate of the U.S. Military Academy and Massachusetts Institute of Technology, he has been commanding general at White Sands since 1962. Formerly, he headed the Ordnance Board, the Ordnance Training Command (including the Guided Missile School) at Huntsville, Ala., the Ordnance School at Aberdeen, Md., and was commanding general of the Ordnance Tank-Automotive Command in Detroit.

## USAEPG Prepares for Influx Of 200 Contract Personnel

About 200 employees of Pan American World Airways and its subcontractor Bell Aerosystems are scheduled to move to the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz., between July 15 and Aug. 1.

Maj Gen Bejamin H. Pochyla, USAEPG commander, said office spaces, warehouses and work areas are now being prepared for the personnel who operate the Electromagnetic Environmental Test Facility at Gila, Bend, Ariz., an USAEPG subordinate activity.

In line with President Johnson's cost reduction program, he said the move is expected to save taxpayers in excess of $100,000 during the next nine months and to establish closer liaison with the contractors for more effective management.

## CRDL Technical Director Addresses Federal Management Seminar

Dr. S. D. Silver, technical director of the U.S. Army Edgewood Arsenal Chemical Research and Development Laboratories, recently addressed a selected group of 30 top level Federal career scientists and engineers.

His topic at a regional management seminar in Philadelphia was "Management of Scientific Effort." A member of the National Research Council and the State of Maryland Governor's Science Resources Advisory Board, he has headed the scientific and technical program of the chemical laboratories since 1956.

The career development seminar was co-sponsored by the Federal Executive Board of Philadelphia and the Philadelphia Region of the U.S. Civil Service Commission.

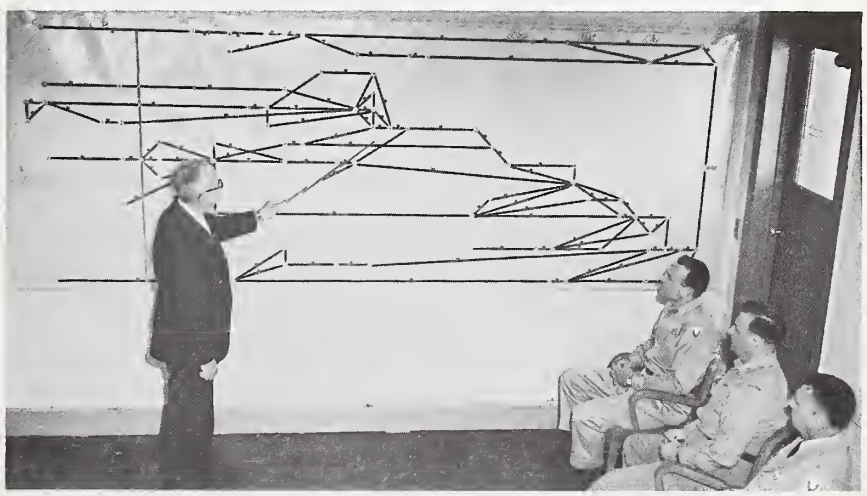
Joining Dr. Silver in a panel presentation at the seminar were Dr. Peter B. Russell, director of research at the Wyeth Laboratories, and Dr. William D. Murray, director of research, Paoli Research Laboratory of the Burroughs Corp.

## Reliability Conference Held On Semiconductor Devices

Twenty-nine technical papers exploring many aspects of the reliability of semiconductor devices and integrated circuits were presented at a mid-June 3-day conference in New York City.

Under auspices of the Advisory Group on Electron devices, Office of the Director of Defense Research and Engineering, the conference was sponsored by the Working Group on Low-Power Devices. Attending were representatives of many of the Nation's largest electronics firms.

U.S. Army Electronics Command personnel from Fort Monmouth, N.J., Leo I. Schumann, E. B. Hakim, B. Reich and J. Bressler, chaired four of the five sessions.



**PLANNED ROUTE—F. T. Miller, assistant chairman of Ad Hoc Task Force on restructuring of U.S. Army Electronics Command, points out target date for rehabilitation of barracks area into administrative buildings at Fort Monmouth, N.J. The required physical changes are charted by the various lines under the Program Evaluation and Review Technique (PERT), with the Dec. 21 completion date at far right. The Critical Path, fourth horizontal line from the top, marks changes that must be made on time to avoid holding up the entire project. Other lines represent installation of communications, signs, etc. Looking on, left to right, are 1st Lt Paul V. Badamo and Capt Frank Sharer, members, and Col C. A. Cuphaver, chairman of the Ad Hoc Task Force.**

# Army Picks 23 Research & Development Award Winners

(*Continued from page 1*)

The range of research and development efforts represented in the awards includes electromagnetic radiation, advanced fuzing for artillery weapons, significant progress in the field of ultra-high-speed electrical motors, nuclear weapon phenomenology, biological sciences, ceramics, wound ballistics, multiple-unit Laser systems, target acquisition concepts, communications, aerial reconnaissance photo interpretation, gamma ray amplification, and the operational research analysis for the Army's nuclear power energy depot system concept.

Nineteen nominations were submitted by Army R&D activities following a thorough review of all major advances at Army in-house laboratories during the past year. General Dick performed the final review, following a screening by an Ad Hoc Committee of judges which narrowed the list to the 15 winners.

All from the Office, Chief of Research and Development (OCRD), members of the committee included Dr. I. R. Hershner, chairman, scientific director of Army Research; Lt Col J. N. Lothrop, Jr., Atomic Office; Lt Col W. P. DeBrocke, Combat Materiel Division; Dr. B. R. Stein, Physical Sciences Division; Dr C. J. Carr, Life Sciences Division; Dr. L. W. Trueblood, Environmental Sciences Division; Dr. S. H. King, Human Factors and Operations Research Division.

The Army R&D Achievement Award consists of a bronze wall plaque and a lapel pin. It was established in 1961 by Lt Gen Arthur G. Trudeau, Chief of Research and Development from April 1958–June 1962, to give "recognition of technical achievements of scientists and engineers by accepted leaders in their field."

Any scientist or engineer of the Department of the Army is eligible. Technicians or subprofessional personnel may also be nominated for the awards. Criteria require that a recipient of the award be directly responsible for a significant scientific or engineering achievement that:

- Establishes a scientific basis for subsequent technical improvements of military importance and/or
- Materially improves the Army's technical capability and/or
- Contributes materially to national welfare.

(For former winners of R&D Awards and achievements that won recognition, see May 1963, June 1962, and August 1961 issues of the *Newsmagazine*.)

**U.S. Army Missile Command, Redstone (Ala.) Arsenal, winners (l. to r.) Ralph W. Hawkins, William B. McKnight, James R. Dearman, William F. Otto.**

The 1964 winners and a synopsis of achievements for which they were selected follow:

DR. HARALD W. STRAUB, Harry Diamond Laboratories, Washington, D. C. Conceived and carried out a research program to measure and analyze the effect of air turbulence on narrow beams of electromagnetic radiation. The acquired data has and will continue to have a profound impact on Army and other Department of Defense weapons and systems dependent on Lasers and narrow radar beams.

DRAGOLYOUB POPOVITCH, Picatinny Arsenal, Dover, N. J. Responsible for advancement of state-of-the-art of mechanical time fuzes for artillery shells and missile items. Conceived a modification to the basic "Junghans Escapement." Invented a new escapement that is both insensitive and rugged to withstand the 23,000 r.p.m. of the M113 Extended Range Howitzer.

RALPH E. HOPKINS, U.S. Army Engineer R&D Laboratories, Fort Belvoir, Va., was recognized for achievements in the field of ultra-high-speed, high-frequency electrical motors and generators and control techniques for these machines. His accomplishments culminated in acceptance of a radically advanced concept in electrical propulsion of ground vehicles.

EDWARD O. BAICY, U.S. Army Ballistics Research Laboratories, Aberdeen Proving Ground, Md., was selected for scientific leadership in the field of nuclear weapons phenomenology and effects, and for foresight in determining the significance of research required for the solution of complex nuclear weapon phenomenology in connection with Army intercontinental ballistic missile problem.

Prior to the first upper high-altitude nuclear test, he predicted the mechanism that would dominate the ionization of very large portions of the atmosphere and the production of intense aurorae at the conjugate points of the earth's magnetic field. Ionization of the atmosphere has important military implications due to effects on radar and communications.

DR. ARTHUR M. SILVERSTEIN, Armed Forces Institute of Pathology, Washington, D.C., was chosen for introduction and use of a developing mammalian fetus as a research model for the study of immune responses. Contrary to previously accepted concepts, he has shown that the mammalian fetus is capable of developing active immunity to disease and that the development of this competence is a complex rather than a single process.

SAM DIVITA, RONALD J. BRANDMAYR, ARTHUR E. BROWN, and ROBERT FISCHER, U.S. Army Electronics R&D Laboratories, Fort Monmouth, N.J. In a team effort, they made an outstanding contribution in the field of fine-particle technology and development of ultra-fine-grain ferroelectric ceramics; developed a fine-grained barium titanate ceramic with a dielectric constant three times that of conventional material; developed and patented an atomizer burner and a unique method for hot pressing ferroelectric ceramics.

DR. ARTHUR J. DZIEMAN, U.S. Army Chemical R&D Laboratory, Edgewood, Arsenal, Md. As chief, Biophysics Division, provided outstanding scientific leadership by establishing and participating in the Laboratory's wound ballistics research program that resulted in development of wound ballistics criteria for various penetrating missiles.

Dr. Hermann Robl
USARO, Durham, N.C.

Dr. A. M. Silverstein
AFIP, Washington, D.C.

Dr. A. J. Dziemian
CRDL, Edgewood, Md.

George H. Orrell
CofEngrs, Washington, D.C.

WILLIAM B. McKNIGHT, WILLIAM F. OTTO, JAMES R. DEARMAN, and RALPH W. HAWKINS, U.S. Army Missile Command, Redstone Arsenal, Ala. Their award is for the concept, research, design and development of a multiple unit Laser array activated by a unique storage system. This was the first time any such system has been operated. Techniques developed by the team have wide application in other areas of Laser research. (Mr. McKnight was also an R&D Achievement Award winner in 1961.)

DR. HANS A. BOMKE, U.S. Army Electronics R&D Laboratories, Fort Monmouth, N.J., conceived, suggested, planned and executed a magnetic measurement experiment that enabled him to develop a method of predicting certain vital parameters that will make possible the detection and location of clandestine high-altitude nuclear explosions.

HERBERT S. HOVEY, Jr., U.S. Army Security Agency, Arlington (Va.) Hall Station, designed and tested an equipment configuration that provides a materially improved capability of target acquisition, which resulted in implementation of an entirely new tactical target.

MYRON C. COLE, U.S. Army Engineer R&D Laboratories, Fort Belvoir, Va., conceived, designed, planned and developed a multiple application welding machine that has the capability of welding both ferrous and non-ferrous metals of heavy and light gauge, including magnesium. Comprised largely of standard military components, it is considerably smaller and lighter than the nearest comparable equipment presently in military use.

MERLE G. HOOTEN, LARRY U. DWORKIN, LT ALVIN W. DRAKE, U.S. Army Electronics R&D Laboratories, Fort Monmouth, N.J., developed a technique for transmitting high-speed secure pulse-code and modulation (PCM) signals over the AN/MRC–91 Tropo-scatter terminal, which included modification of the terminal equipment.

This achievement makes possible the provision of security for large volume of tropo-scatter traffic with relatively conventional security devices. (Lt Drake is the second Army officer to share in a team effort for an R&D Achievement Award, and was awarded a Certificate of Achievement in lieu of individual plaque and lapel pin.)

DR. ROBERT SADACCA, U.S. Army Personnel Research Office, Washington, D.C., established a scientific basis for expected technical improvements of military importance in the area of computer technology applied to aiding human decisions in information processing. He devised a major and novel program to provide image interpretus with computer-derived information that could materially influence level of performance, and instiuted a program for evaluating the use of psychophysical judgments in specifying the quality of aerial reconnaissance imagery.

DR. HERMANN ROBL, U.S. Army Research Office, Durham, N.C., conducted an independent feasibility study of gamma ray amplification by stimulated emission of radiation (Graser). This study was instrumental in preventing the waste of funds and dissipation of R&D effort in pursuing a process which, though seemingly attractive, is nevertheless scientifically infeasible in the light of presently known physical principles.

GEORGE H. ORRELL, Engineer Strategic Studies Group, Office, Chief of Engineers, Washington, D.C., independently conducted the original operational research analysis of nuclear-powered energy depot system.

This radically advanced concept to provide combat armies, particularly in remote areas, with a greatly reduced logistical burden, is presently being pushed as a high priority project following recent approval by the Army Scientific Advisory Panel. (For complete description, see the December-January 1964 edition.)

DIRECTORS OF FOUR LABORATORIES at Redstone (Ala.) Arsenal's Francis J McMorrow Missile Laboratories pose at main entrance to the new $4.6 million structure occupied by more than 400 employees working in missile research. Left to right are William C. Watson, Ground Support Equipment Laboratory; Will A. Lewis, Structures and Mechanics Laboratory; Dr. William C. McKorkle, Advanced Systems Laboratory; Delman E. Rowe, Electromagnetics Laboratory.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# Army Announces 23 Selections For R&D Achievement Awards

*Pictured on this page are 15 of the 23 Research and Development Achievement Award winners for 1964. For the other winners and achievements that earned them awards, see pages 1, 34 and 35.*

(1) MYRON C. COLE, U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va. (2) EDWARD O. BAICY, U.S. Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md. (3) RALPH E. HOPKINS, U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va. (4) DRAGOLYOUB POPOVITCH, Picatinny Arsenal, Dover, N.J. (5) LARRY U. DWORKIN, LT ALVIN W. DRAKE, and MERLE G. HOOTEN, U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J. (6) SAM DIVITA, RONALD J. BRANDMAYR, ROBERT FISCHER, and ARTHUR E. BROWN, Army Electronics Research and Development Laboratories, Fort Monmouth, N.J. (7) DR. HANS A. BOMKE, U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J. (8) HERBERT S. HOVEY, Jr., U.S. Army Security Agency, Arlington Hall Station, Arlington, Va. (9) DR. ROBERT SADACCA, U.S. Army Personnel Research Office, and (10) DR. HARALD W. STRAUB, Harry Diamond Laboratories, Washington, D.C.


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